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SOUTH
AMERICAN
PILOT.
—♦♦♦—
PART I.



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THE
SOUTH AMERICAN PILOT.

PART I.

THE EAST COAST OF SOUTH AMERICA FROM
CAPE ST. ROQUE TO CAPE SAN ANTONIO,
RIO DE LA PLATA;

AND

THE NORTH COAST FROM CAPE ST. ROQUE TO
THE RIO MARONI IN FRENCH GUAYANA.

COMPILED BY

STAFF COMMANDER JAMES PENN, R.N.

PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY.

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ADVERTISEMENT.

THE South American Pilot consists of two parts. Part I. contains Sailing Directions for the East coast of the Continent, from Cape St. Roque to Cape San Antonio, in Buenos Ayres, including the Rio de la Plata and the island of Trinidad; and for the North coast from Cape St. Roque to the Rio Maroni in French Guayana. Part II. contains Sailing Directions for the East and West coasts from the Rio de la Plata round Cape Horn to Guayaquil and the Bay of Panama, including Magellan Strait and the Falkland and Galapagos islands.

The coast from the Rio Mossoro about the meridian of $37^{\circ} 8' W$. round Cape St. Roque, and as far south as the Rio San Francisco, on the parallel of $10^{\circ} 30' S$., has been surveyed by Commander A. Vital de Oliveira, of the Brazilian Imperial Navy in 1857-59. Thence to the island of Santa Catharina the charts are chiefly by M. le Baron Roussin, 1819-20, with many additions and corrections by M. Mouchez, of the French Imperial Navy. The coast between Santa Catharina and Cape Castillos is yet but imperfectly known. The Rio de la Plata is from the surveys of Admirals FitzRoy and Sullivan, Commander Sidney, the French charts of 1833, and the Spanish of 1837, with also many additions and corrections by M. Mouchez.

The north coast of Brazil westward of the Rio Mossoro to Maranham is from the running survey of M. le Baron Roussin in 1820, whilst Maranham and thence to Guayana the charts are by Tardy Montravel 1842-45.

The first part of this work has been compiled from the above surveys, and the authorities mentioned in the next page, but from the large extent of coast which yet remains imperfectly examined, this work must necessarily be considered incomplete. Officers both of the Royal and Mercantile Navy are therefore requested to transmit to the Secretary of the Admiralty notice of any errors or omissions they may discover, or any fresh information they may obtain, with a view to its improvement for the general benefit of the mariner.

G. H. R.

Hydrographic Office, Admiralty, London,
April 1864.

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M. le Baron Roussin, Capitaine de Frégate	-	-	1819-20
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Charles Phillippe de Kerhallet, Lieutenant de Vaisseau	-	-	1841
Tardy Montravel, Capitaine de Frégate	-	-	1842-51
Ethiopic Directory, by Purdy and Findlay	-	-	1855
Notes on the South Atlantic by Rosser	-	-	1862
A. Vital de Oliveira, Commander Brazilian Imperial Navy	-	-	1857-59
M. Mouchez, Capitaine de Frégate	-	-	1863
Annales Hydrographiques.			
Nautical Magazine.			
Mercantile Magazine.			
Remark Books of Officers on the South-East Coast of America.			

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**IN THIS WORK THE BEARINGS ARE ALL MAGNETIC,
EXCEPT WHERE MARKED AS TRUE.**

**THE DISTANCES ARE EXPRESSED IN SEA MILES OF
60 TO A DEGREE OF LATITUDE.**

**A CABLE'S LENGTH IS THE TENTH PART OF A MILE, OR 101.26
FATHOMS, BUT ASSUMED TO BE EQUAL TO 100 FATHOMS.**

THE SOUTH AMERICAN PILOT.

PART I.

CHAPTER I.

GENERAL OBSERVATIONS ON PASSAGES, WINDS, CURRENTS, &c.;
AND DESCRIPTION OF FERNANDO NORONHO, AND ST. PAULS
AND ROCCAS ROCKS.

THE first part of this work contains a description of the East coast of the continent of South America, from Cape St. Roque to that of San Antonio, the south point of entrance to the Rio de la Plata, including that river; and of the north coast from Cape St. Roque to the rio Maroni in French Guayana. The second part describes the coast from the La Plata round Cape Horn to Guayaquil and the bay of Panama, including Magellan strait and the Falkland and Galapagos islands.

ROUTES.—The course of a steamer on leaving the English or St. Georges channel for Brazil, will be nearly on a great circle as far as circumstances admit; but a sailing vessel should at once make westing, as the prevailing winds are those from that quarter. From the Lizard, with a fair wind, a W.S.W. course should be steered until in long. 10° or 12° W. so as to enable a vessel to weather Ushant should the wind become adverse. If the wind veers to the westward, the seaman must take care not to be drawn into the bay of Biscay, which is especially to be avoided.*

Rather than run any risk, it will be better to make a board to the westward, in which a vessel may be assisted by the Rennel current; and since westerly winds generally veer to the N.W., if a good offing has been made, the vessel's course can afterwards be pursued a point or so free, making allowance for a south-easterly set. From long. 10° or 12° W., a course may be shaped for Madeira, which may be passed at any convenient dis-

* See Charts :—North Atlantic, No. 2,060, scale $d = 0.5$ of an inch; and South Atlantic, No. 2,203, scale $d = 0.4$ of an inch.

tance. In the winter months it is preferable to pass to the westward, for the strong westerly gales which prevail in November, December, and January, produce eddy winds and heavy squalls near the east side of the islands.

From Madeira, a vessel may pass westward of the Cape de Verde islands, or eastward of the group with about equal advantage, from December to April, but not later. When the sun is near the northern tropic, the N.E. trade often fails near these islands and light winds prevail, they should then be passed at least 30 miles to the westward, where the wind will be found steadier. In proceeding to the southward, the line may be crossed anywhere between long. 25° and 30° W., as between these meridians the zone of the variable winds of the equator is narrower than it is towards the coast of Africa, and it is frequently passed without calms.

When the variable winds succeed the N.E. trade wind, or the S.E. trade wind is met with, a vessel may stand on the tack which gains most southing, although experience proves it is more advisable to stand to the south-westward on the port tack, even should the vessel fall off to W. by S., as the wind will draw to the eastward as the vessel advances, and finally to East and E.N.E. at the southern limit of the trade.

To vessels proceeding direct to Brazil, after getting well to the westward, it is recommended to shape a course to cross the lat. of 40° N. in 19° or 20° W. ; the lat. of 35° in about 22° W. ; the lat. of 30° between the meridian of 25° and 30° W., but not to contend with adverse winds for it ; having reached the latter parallel, the course will be South for the line between the same meridians. In summer and fall, vessels should enter the southern hemisphere about the meridian of 30° W., but during the rest of the year they will generally not be forced so far to the west, though they should avoid going east of long. 25° .*

When in the vicinity of St. Pauls rocks, chronometrical observations should be frequently taken, allowance made for the current, and a good look out kept ; see page 16. In proceeding to the southward, if to the westward of Fernando Noronho, the same precautions are necessary to avoid that dangerous reef, the Rocas. From the month of March until September, when the wind is from the south-eastward, and the current near the coast of Brazil sets to the northward, it will be prudent to keep 120 to 150 miles from the land until well to the southward, and steer so as to be to windward of the port of destination ; but from September till March when the north-easterly winds prevail, and the current sets to the southward, the coast may be approached with prudence, and a vessel may steer according to circumstances for her intended port.

* Maury.

ROUTE Homeward.—In leaving the ports to the southward of Pernambuco, in the parallel of about $8^{\circ} 3' S.$, for Europe, the N.E. winds sometimes compel sailing vessels to keep on the port tack 10 or 15 days, and to stand S.E. or even S.S.E. as far as the parallels of 28° or 32° ; and as far as the meridian of Trinidad island. Then on the starboard tack, it is almost certain that a vessel will weather the easternmost part of the coast. In proportion as she gets to the northward on this tack, the wind will draw from east to south-east. By adopting this course, it will be seldom a vessel will not be able to pass to windward of the island of Fernando de Noronho, and cross the line between the longitude of 25° and 30° ; or by crossing it two or three degrees more to the westward, the voyage will not be lengthened.

On leaving Pernambuco, which is the most eastern part of Brazil, vessels from a good offing will probably be able to stand well to the northward on the starboard tack. The direction of the coast then inclines to the westward, and the winds in these latitudes being generally from the eastward, they will probably sail free in advancing to the northward; but if the winds will not permit pursuing this route, which will be an exception, it is preferable to make a stretch immediately to the south-eastward; and this rule applies to all the ports on the coast when bound from one port to another, or directly to the northward. Working along the coast, subject to currents, light land winds at night, and bordered by reefs, cannot be attended with much success. See page 127.

WINDS.—Variable winds prevail in both hemispheres beyond the limits of the trade winds. In the North Atlantic ocean, when the sun is in the northern hemisphere, the prevailing westerly winds are S.W. and W.S.W.; if, on the contrary, the sun is in the southern hemisphere, they are from W.N.W. and N.W. This last period is that of gales and bad weather between North America and Europe. In the British channel easterly winds prevail in February, March, April, and part of May; during the other months westerly winds predominate.

In the South Atlantic ocean westerly winds are predominant, varying from N.W. to S.W., but they are changeable and irregular, extending as far as the tropic of Capricorn, and sometimes even to the parallel of $20^{\circ} S.$ In the zone between the parallel of 28° and $35^{\circ} S.$, the winds are extremely variable; but those which are most frequently met with are from N.E. to N.W. by N., and from N.W. to S.W. by W., principally during June, July, and August.

The polar limits of the N.E. and S.E. trade winds in the Atlantic ocean generally extend on each side the equator to the parallel of 30° north and south latitude. This limitation varies greatly in some parts of the ocean, being influenced by temperature, and varies about 3° north or south,

according as the sun's declination is north or south. The equatorial limits of these trades are generally variable from the same causes ; that of the N.E. trade is about the mean parallel of 8° N., and that of the S.E. trade is at the parallel of 2° or 3° N. When the sun is in the northern hemisphere and at its greatest distance from the equator, the N.E. trade wind inclines more to the east, and stronger winds are then experienced than at any other time ; while in the southern hemisphere, at this time, the S.E. trade veers more to the southward.

If the sun is in the southern hemisphere, the same effects are produced in an inverse order ; thus the S.E. trade wind blows more from the east, while the N.E. trade veers towards the north. It is at this time that the trades make their nearest approach to the equator. During winter, the northern trade is sometimes gained before reaching the latitude of Madeira ; this fact is, however, only an exception. At other times the variable winds of the temperate zone extend to lat. 20° N., without appearing subject to any general law, and this too in all seasons. In the southern hemisphere similar facts present themselves ; thus during the fine season, the limit of the S.E. trade is about the parallel of the Cape of Good Hope, while, from June to August, westerly winds prevail between that parallel and the southern tropic.

The northern limit of the N.E. trade wind extends on the eastern side of the Atlantic, that is off the coast of Africa, to lat. 35° as a mean, in August and September, being then at its greatest northern extent ; but it is frequently found when in lat. 38° and sometimes even at 40° . To the westward of the meridian of 30° the northern edge seldom extends northward of 33° or 34° , while towards the Bahamas the northern limit is 30° . This northern range appears to be attained in August and September, when, following the sun in its southward course, it reaches its southern limit in March or April.

The N.E. trade wind varies considerably under the influence of the land, and to the eastward of long. 25° W., within 400 or 500 miles of the coast of Africa, it blows more from the northward than it does in the open ocean. Between the Canaries and Cape Verde islands during the northern summer months, it blows from N.N.E. to N.E. for 55 days out of every 100 ; and during the winter months, from January to March, the wind in the neighbourhood of Cape Verde draws to the N.W. and West. In the vicinity of the Canary and Cape Verde islands, calms and light airs are more prevalent than farther westward, especially in the summer and autumn months, from July to December.*

* The mariner will find much useful information by referring to the Wind Charts published by the Board of Trade.

TABLE showing the limits of N.E. and S.E. trades :—

Periods of the Year.	Polar limits of N.E. and S.E. Trades.	Equatorial limit of N.E. Trade.	Equatorial limit of S.E. Trade.	Polar limit of N.E. Trade, according to the months.	Steering South the N.E. Trade is lost in north latitude, from	Steering South the S.E. Trade is found in north latitude, from
Winter -	24 45 N. or S.	5 45 N.	2 30 N.	Jan. 23 24 N. Feb. 28 39 March 27 19 April 28 18 May 28 31 June 31 25 July 29 36 Aug. 31 11 Sept. 32 4 Oct. 25 38 Nov. 27 14 Dec. 22 15	5 to 10 5 " 10 2½ " 8 4 " 9 5 " 10 7 " 13 8½ " 15 11 " 15 9 " 14 7½ " 13 6 " 11 5 " 7	2 to 4 0½ " 1 0½ " 2½ 0 " 2½ 0 " 4 0 " 5 1 " 5 1 " 3 1 " 3 1 " 5 3 " 5 1 " 4½
Spring -	28 0 N. or S.	5 45 N.	1 30 N.			
Summer -	30 45 N. or S.	11 30 N.	3 15 N.			
Autumn -	28 30 N. or S.	10 0 N.	3 14 N.			

It will be seen that the most favourable time for crossing the line will be from December to June, when the passage will be less interrupted by calms, squalls, and variable winds. In the northern hemisphere, the N.E. trade wind verges, according to the season, more or less towards the equator; but it seldom passes to the southward of it. On the contrary, the S.E. trade wind reaches it easily, and sometimes extends as far as 5 N. latitude, and that in the neighbourhood of the coast of America.

Sometimes the N.E. and S.E. trade winds join each other, generally somewhere about the meridian of 28° or 33° west, where a ship may pass in a squall from one trade to the other. Near the equator, the winds generally draw more from east to south than from east to north. In the western part of the southern Atlantic, the southern limit of the S.E. trade has been met with full 7° nearer the equator than in the eastern.

GUAYANA.—The year is divided into two seasons on the coast of Guayana; the winter, which commences in November and ends in July, and the summer or dry season, which lasts from July to November.

This coast is situated on the limits of the trade and variable winds, which limits change their place according to the seasons. When the trade wind from E.N.E. blows with all its force, which is during the winter, they extend to the southward, at which time the coast of Guayana and a part of the Brazilian coast, from the mouth of the Amazons to Cape St. Roque, are completely within its limits; during the summer this limit recedes to the northward. The change of the seasons depends on the period at which the trade winds become settled on the coast.

In the northern hemisphere the trade winds generally commence to blow between East and E.N.E. in the month of November, occasionally at the end of October, and at other times not before the commencement of December. As the winds acquire strength, they soon reach the northern

part of the coast of Guayana, become prevalent, and extend progressively along the coast of Brazil as far as Cape St. Roque; they are even found to the southward of that cape, but with less force and constancy. In the beginning of December the winds are generally quite steady at Cayenne, and in January and February they attain their greatest force.

In March these winds become weaker and get farther to the northward. At the end of April and during the month of May, the change of season begins to take place; the variable winds extend and approach near the coast, calms and squalls are frequent, and sometimes it blows fresh from the S.E., which is more constant in proportion as July or the commencement of summer is near. About the beginning or middle of April the E.S.E. winds reach the coast; they approach first Cape St. Roque, then extend to the northward, and soon reach along the coast to the mouth of the Amazons. As soon as these winds have acquired sufficient strength, they overcome those from the E.N.E., which in May and June are to be found to the northward of the Amazons; and the latter, inclining more to East and E.S.E., become general along the whole coast of Guayana.

In June the variable winds which extend from the equator to lat. 12° or 13° N., generally reach the coast of Guayana; squalls are still frequent, and the E.N.E. winds are rainy. With a continuance of E.S.E. winds fine weather sets in and the rain is carried to the West Indies. In July squalls and calms are less frequent, and the direction of the wind is more from E.S.E. than E.N.E., and the weather is more frequently dry than wet. In August, September, and October the winds on the coast of Guayana and Brazil are from E.S.E., and have acquired their full force; they blow almost uninterruptedly; and to the northward of Cape St. Roque very fine weather prevails. It has, however, happened that in some years the seasons have been entirely reversed.

The winds during the winter blow nearly directly on the coasts of Guayana and the north part of Brazil, and preserve their whole strength during night. At the end of March they begin to vary in direction; at sunrise they blow between East and E.N.E.; at eight from N.E., and sometimes in the afternoon and a part of night from N.N.E. The winds from E.S.E. which blow fresh, are those of summer, decrease in force during the night, but extend some miles from the coast, as well as by day. The sooner they commence in the morning the stronger they are. Winds from S.W. to N.W. blow at intervals during all seasons; they are less frequent in winter than in summer, and generally last but a short time.

There are seldom any squalls on the coast between Trinidad and Cape St. Roque during strong E.N.E. winds. In the months of April, May, and June, when the change of the season takes place, and also when the E.N.E. winds are followed by those from E.S.E., calms, squalls, and

storms are frequent. The change of winds from E.S.E. to E.N.E., which takes place in November, is effected more suddenly; the atmosphere is more tranquil; the squalls, calms, and storms are less frequent.

COAST OF BRAZIL.—On the east coast, as far as lat. 10° S., the S.E. trade is the prevailing wind throughout the year, but blowing more easterly from September to March; southward of the 10th parallel, when the sun is in the southern hemisphere, the prevalent winds are from N.N.E. to East towards and along the land from the north; when the sun is in the northern hemisphere, the S.E. trade is the prevailing wind from lat. 20° S. to the equator, blowing between East and S.E. towards and along the land from the south. In general, the farther south along the coast in the rainy season, the more the winds draw to the southward and westward, and frequently blow strong.

There are, along the coast, local winds, squalls, and gales; these are, the Rebojos, or S.W. squalls of the rainy season, blowing for 3 or 4 days, at which time the sky is unsettled, but moderating when accompanied by rain. Off the coast of Maranhão heavy squalls of short duration are frequent, blowing from North to S.W. by S., during the rainy season, from February to May, accompanied by constant thunder and lightning; the Abrolhos squalls are frequent between May and August, when the season is wet; the Terre Altos or N.W. squalls in the vicinity of Rio Janeiro lasting 5 or 6 hours; and on the coast between Cape Frio and Rio Grande do Sul heavy squalls and gales similar to the pampero of the Rio de la Plata, from S.E. to S.W., and occasionally from N.W., are experienced; they seldom, however, last more than a day or two, but blow at times furiously.

Their indications are the same as those of a gale in Europe. If the sun sets surrounded by heavy clouds, and the land appears very clear, and near the spectator, the wind may be expected to blow hard from south to south-west. The duration of these pamperos is less in proportion to their strength. Their strength and their duration diminishes in proportion as the equator is approached. When the winds from the south-east to south-west of the southerly monsoon* are moderate, they draw to seaward, that is to say, to the east during the day, and the west during the night.

As soon as the wind veers to the east, the weather becomes fine; but when it draws to the west it becomes cloudy and unsettled. At about 25 miles from the land the ordinary force and direction of the monsoons will be found. About the equinoxes, but more especially when the sun is advancing northward, calms and light winds, with apparently

* Monsoon or Monsun (Malayan, *musim*, the *hippalos* of the Greeks,) is derived from the Arabic word *mausim*, a set time or season of the year. The word is commonly applied to the seasons at which certain winds prevail.

no settled direction, prevail near the coast, and this may be said to be more particularly the case between the Abrolhos islets and Cape Frio. *See p. 73.*

LAND and SEA BREEZES are felt, more or less, along the whole coast of Brazil, but the latter wind is generally the stronger, and blows longer; the land wind is often feeble, and of short duration, and not to be depended on. During the northerly monsoon the land winds are more regular and stronger than in the southerly, because the trade winds then blow more directly and constantly on the coast, and the reaction caused by the coolness of the nights inland produces stronger and more regular effects. In the southerly monsoon, the winds being often variable from about S.S.W., the land winds mix or unite with them. The stronger the sea breeze is, so is also the land wind.

The DRY SEASON commences on the whole eastern coast of Brazil about the end of September, and continues till February; during this period it occasionally thunders, but seldom rains, even in the squalls, which come nearly always from the north and west. The years in which it rains during these five months are considered on the greater part of the coast as exceptions.

The RAINY SEASON includes the remainder of the year, but it does not rain so much as to justify the name. The only periods which may deserve it are a part of May, June, July, August, and sometimes part of September.

At Rio de Janeiro it rains much more in the last month of the northerly monsoon, which is generally the dry season, than during the rest of the year. From November to March there are frequent squalls, at about sunset; they are accompanied with thunder and heavy rain, to which succeeds quickly a fine clear sky.

At Santa Catharina, squalls and heavy rains also occur during some months of the dry season. But these anomalies are peculiar to certain places, and do not prevent the seasons from having that character which have been assigned them in general on the coast. The worse months of the rainy season are marked by frequent fogs, by continual humidity, and heavy rains, which prevail sometimes ten or twelve days successively. At this time of the year, frequent sickness occurs, occasioned by the excessive damp; the heats which follow increase rather than check it; and it has been asserted that the sickness is great in proportion to the diminution of the average amount of thunder experienced at the time of the equinoxes.

On the northern coast, the seasons vary a little from the above rule. In the months of January and February, the time at which the winds from the E.N.E. are the most frequent and have the greatest force in the

north, rain falls for a fortnight or three weeks, from Cape St. Roque as far as Pernambuco, but not in any great quantity. This rain is less frequent as we advance to the south. The inhabitants of Pernambuco call the rain which falls at this period "the little rain." The winds from the East and even S.E. prevail in that vicinity as often as those of the E.N.E. during the other part of this season, that is to say, in November, December, March, and the greater part of January and February.

The rains commence in general as soon as the wind from E.N.E. is felt on the coast, and continue, with some interval of fine weather, during nearly all the winter; but it frequently happens, that after these winds are well set in, fine weather continues. They sometimes bring rain in November, and days of fine weather occur in the months of December, January, and February; but in the end of March and at the commencement of April, fine weather lasts about three weeks at a time. The natives of the country call this "the summer of March."

In the month of May the rains are most abundant; the time that they last is called in the country *poussinière*. The summer of March altogether fails sometimes in the rainy season, but the *poussinière* or the abundant rains of May never. The weather is also subject to great change on the coast of Guayana; the seasons depart sometimes from their regular order, and appear to be inverted. In the year 1823, very little rain fell; in 1824-5, the dryness of the season was very remarkable on the whole coast of Guayana, and on the north coast of Brazil. Cayenne experiences less differences of climate than those places which are nearer to Cape St. Roque.

CURRENTS.—When we consider that the general way to ascertain the existence and the velocity of currents at sea, is to compare the place shown by the dead reckoning with that determined by accurate observations; and at the same time, the uncertainty of the reckoning produced by irregularities in both the course and the distance sailed, it will no longer be a matter of surprise that our knowledge of currents should be so imperfect. It is a general remark, that vessels sailing before the trade, or any other prevalent wind, find themselves several miles a head of their reckoning, in proportion to the length of the run; it is therefore recommended for the seamen always to make some allowance according to the force of the wind.

Although it may appear out of place to introduce into this work an account of the Rennel and Portugal currents, yet, as a vessel may be affected by them in her route to Brazil, we have thought it not inconsistent to draw the attention of the mariner to them.

The **RENNEL CURRENT** has an easterly direction near Cape Finis-terre. It flows along the north coast of Spain, then north along the west

coast of France, where it is felt at 30 or 40 miles off shore, and is 15 or 20 miles across. It has been found to run from a half to two-thirds, and sometimes a mile an hour, and varies according to the strength and direction of the wind. It becomes wider as it proceeds northward; in the lat. of Brest it is 80 miles across, and its direction nearly N.W. It passes westward of Ushant at 15 or 20 miles from that island, crosses the entrance of the English channel, and takes a westerly direction from the Scilly isles. At the entrance of the Irish sea it is divided into two branches, one of which is diverted into that sea, whilst the principal branch flows W.N.W. and West towards Cape Clear, and loses itself near the meridian of 18° W., in the polar current running towards northern Africa.

The PORTUGAL CURRENT flows from about the parallel of 45° N. to the south-east and south along the coast of Portugal until having passed Cape St. Vincent, when it runs easterly toward the strait of Gibraltar. After passing the mouth of the strait, the stream trends more to the south and becomes irregular amongst the Canary islands, and between that group and the coast of Africa. It is felt westward of Madeira or about 390 miles from the coast, beyond which it sets to the south-westward.

From the Canaries to Cape Verde it generally sets from South to S.S.W. The velocity of this current has been found to be from 12 to 20 miles a day, and variable according to the direction, duration, and force of the wind. It may be taken for granted that the whole surface of that part of the Atlantic ocean from the parallel of 40° to 45° , at least, and from 300 to 390 miles from the land, is in motion towards the strait of Gibraltar.*

Chronometric observations are therefore especially necessary in running to the southward, amongst the Canary and Cape Verde islands, in order to correct a vessel's position for the effects of currents which prevail between the parallels of Cape Finisterre and that of the Cape Verde islands.

The EQUATORIAL CURRENT begins to be felt about 120 miles west of the meridian of Cape Verde, and sets from east to west, increasing its rate as it advances to the west sometimes to $2\frac{1}{2}$ and even 3 miles an hour; yet, it is occasionally so uncertain as to warrant the seamen in being ever on the watch, by following up his observations night and day. The motion communicated to the waters, by the continued action of the wind blowing in one direction, seems to be the chief cause of the currents that exist on the eastern coast of America, and amongst the islands in the West Indies; a circumstance without a parallel in any other part of the

* Major Rennel.

globe, and known, especially on the coast of North America, by the name of the Gulf stream.

The winds from the eastward, blowing all the year round between the tropics, must unquestionably impress upon the surface waters a motion to the westward; in which direction the equatorial current, in its ordinary course, appears to divide into two branches about the longitude of 23° W., the northern portion flowing in a north-westerly direction, and the southern, which is the largest portion, running in a course southward of West until it reaches near the coast of South America, when it is again sub-divided between Cape St. Roque and Cape St. Augustino, the northern branch running along the north coast of Brazil and Guayana, where it is augmented by the union of the waters of the great rivers which there disembody, whilst the southern branch sets along the eastern coast of Brazil.

BRAZIL CURRENT.—The direction of the southern part of the equatorial stream appears to turn gradually to the southward on approaching the continent, and from latitude 6° or 7° S. runs along the coast at the distance of 250 or 300 miles until near the parallel of the Rio de la Plata, where it seems to divide into two branches. The larger, taking an easterly direction, forms the cross current of the south Atlantic; the other branch, continuing feebly to the southward, is sometimes met as far as the entrance of the strait of Magellan.

In the space between the southern branch of the equatorial current and the coast of Brazil alternate currents are met with, occasioned by the periodical winds on the coast. The force of these currents depend on the strength and direction of the winds. From March to September, when the winds are from the south-eastward, the current sets northward; and from September to March, when the winds are from the north-eastward, it sets to the southward, and reaches probably about 150 miles from the coast. The mean velocity of the southern branch of the equatorial current near the equator is about $1\frac{1}{2}$ miles an hour, but in its course to the southward its rate is diminished to about half a mile an hour. See page 24.

NORTH COAST of BRAZIL and GUAYANA.—The great general current caused by the surface water of the Atlantic being continually blown to the north-west by the prevailing winds, runs along the north coast of Brazil and Guayana at all times of the year. Its rate may vary from less than half a mile to 4 miles an hour, according to the distance from the middle of the stream and the season of the year. The outer edge may extend from the coast at a distance of about 240 miles, and its inner edge from less than 15 to more than 45 miles, but the exact position where its strength slackens or its direction changes is uncertain and defies all rules.

Generally a counter-current will be met with between lat. 7° and 10° N. on the meridian of about 53° W., where the westerly stream changes its course to the North and N.N.E. Farther eastward, it increases in breadth, its strength is greater, and its direction more easterly as far as long. $37\frac{1}{2}^{\circ}$. From thence it progressively widens, decreases in strength, and loses itself in about long. $25\frac{1}{2}^{\circ}$ W. In the northern part of this easterly current the stream inclines more to the north, and the contrary on its southern limits. Besides which, the regular inshore tidal streams set towards the shore during flood, and seaward to the north-east during the ebb.

The E.N.E. winds are regular and of a certain strength between November and May in that part of the torrid zone which is to the northward of the limits of the variable winds; they consequently cause a westerly current. The water thus forced to the westward accumulates on the coast of Guayana; and at Cayenne during the months of January, February, and March, it is about six inches higher than in September and October. In May it begins to fall, when the current appears the strongest, and between Maranham and the Amazons, at 150 miles from the coast, it has been found setting to the westward $3\frac{1}{4}$ miles an hour; and a vessel from Cayenne to Martinique, in lat. 9° N. 180 miles from the land, has been set N.N.W. 97 miles in 24 hours.

The winds from E.S.E. which prevail from May until October on all the coast of Guayana, are not felt at a great distance from the land, which varies according to the position of the belt of variable winds at different distances from the coast. The currents are retained within the same limits, and at about 240 miles from the coast, wherever the general winds are met with, the currents set westward. But in the belt of variable winds (where the south-west winds blow sufficiently often and with a certain strength from July to November) they are irregular and more frequently take an easterly than a westerly direction.

In the month of May, in lat. 5° N., at about 300 miles from the land, it has been known to set 32 miles eastward in 24 hours; and in September in lat. 8° N., at 235 miles from the land, 52 miles eastward in 24 hours.

The brigantine *Montie Christo*, from Cayenne to the Paranaíba or Pernaíba in Brazil, in July and August 1862, took her departure from Mère islet, one of the Remire islands, on the 26th, the wind east, a direct northerly course was made until the 30th, when the vessel was in lat. 7° N. and on the meridian of Cayenne. On this day the wind changed to south and continued to blow from that to S.S.W. until the 7th of August, when the vessel's position by dead reckoning was $42^{\circ} 14'$ W., and an Austrian vessel that was spoken, gave the longitude as 27° W. It was not discovered until some days after that the latter was the actual longitude.

It appears that for eight consecutive days the *Montie Christo* was set at the rate of $4\frac{1}{2}$ knots an hour in an E.S.E. direction. Throughout the remainder of the voyage, extending over a period of 14 days, the same current was experienced. The captain of another vessel, the *Loyal*, which arrived at Parahiba some days after, having a chronometer on board, had abandoned his observations, believing his chronometer had gone wrong. The French steam vessel of war *Alexton*, from Surinam to Cayenne, met with the same phenomenon, leaving little room for doubt that the current was setting to the eastward throughout and for some time.*

Navigators have attributed these easterly currents to the abundance of water from the rivers of Guayana, and principally from the Amazons and the Orinoco ; but it is chiefly during summer or between May and November, that these currents are found, and when at 150 or 180 miles from the mouth of the Amazons, strong currents have been setting to the westward. The French corvette *Diane* in September 1823, between the parallels of 6° and $4^{\circ}.30'$ N., and on the meridian of 45° W., at about 450 miles from the mouth of the Amazons, during 48 hours was set to the eastward between 2 and 3 knots an hour ; but on approaching at least 90 or 120 miles nearer the mouth of the Amazons, she had a westerly set of $1\frac{1}{2}$ miles an hour.

In May 1823, the time of the greatest rains on all the coast of Guayana, the French corvette *Circe*, at 240 miles from the mouth of the Orinoco, was set to the westward 48 miles in 24 hours ; and in May 1826 the *Lyonnaise*, when only 90 miles farther off, was set 15 miles to the northward in 24 hours. The easterly currents cannot therefore be attributed to the waters of the Amazons and Orinoco, which have been found at so great a distance from their mouths ; and it is certain that the waters from the smaller rivers on this coast mix with the principal current setting to the westward without sensibly altering its direction.

Many proofs have been given that the waters of the Orinoco do not extend to any very great distance from the land, and at 240 miles from it, the current may be found running in various directions. During the summer season vessels from the northward often make the land at Cayenne without any sensible error in their estimated longitude ; nevertheless, in this season the current near the coast runs strong to the westward, and it is natural to suppose that they must have been set to the eastward by a counter current. The current which set the *Montie Christo* so far to the eastward, could not have been caused by the waters from any rivers. See pp. 288-312.

* Royal Geographical Society, 12th January 1863, ocean currents on the north-east coast of South America, by J. A. Man, Esq., F.R.G.S.

The **SARGASSO or GULF WEED** is found in the space between the parallels of 37° and 18° N. and the meridians of 30° and 43° W. This space, known as the Sargasso sea, is commonly spread over with the weed, *fucus natans*, like an inundated meadow, in some places very abundant, and in others more dispersed. The limits of the weed may change greatly at different times, and it is more than probable that the change of the seasons greatly affects these as it does the limits of the trade winds and intervening calms, the more especially as it is to the varying currents caused by these winds that the weed is retained in its locality; consequently we may look for its northern and southern boundaries more to the southward during the northern winter months, and the reverse during the summer.

The tropic, or about the parallel of 23° N., may be considered its southern edge in the long. of the Azores, from whence it extends to the Virgin islands and the Bahamas. Its northern edge runs from the Azores to the outer edge of the Gulf stream off Cape Hatteras; and although its limit may change greatly at different times, it may always be looked for within the above area. It was first seen by Columbus in 1492; there it has remained to this day, and exact observations as to its limits and range extending back for upwards of fifty years, assure us that its mean position has not altered since that time.

The **BAROMETER** showing the weight or pressure of the air, and foretelling rather than indicating the present state of the weather, should never be distrusted because the state of the weather does not accord with the general notions of its indications. Important changes rarely arise from local causes at the place of observation itself, but their origin is to be looked for in a disturbance of the equilibrium of the currents of the atmosphere at a distance, and generally not on the surface of the earth, but in the higher regions. The longer the time between the signs and the change foretold by them, the longer such altered weather will last; and, on the contrary, the less the time between a warning and a change, the shorter will be the continuance of such foretold weather. In the higher latitudes the range of the mercury is large, or from 2 to 3 inches; between the tropics it is a few tenths only, except before gales or hurricanes in those regions, when it sometimes falls to 27 inches.*

Vessels bound into the southern ocean, after entering the tropics, will find the mercury rise and fall under the ebb and flow of a regular atmospheric tide, which gives a high and a low barometer every day, with such regularity that the time of day, within a few minutes, may be known by it. The rise and fall of this tide, measured by the barometer, amounts to about

* See The Barometer Manual, by Rear Admiral FitzRoy, 1860.

one-tenth of an inch, and it occurs daily and everywhere between the tropics ; the maximum about 10h. 30m. a.m., the minimum between 4 and 5 p.m., with a second maximum and minimum about 10 p.m. and 5 a.m.

The mercury, day after day through the year, reaches its highest and lowest reading with such regularity and certainty that the navigator may refer to it as a natural standard ; thus, " within certain limits of latitude, near the equator, the barometer varies so little from a normal height, now ascertained, that, allowing for its tidal change, the seaman between those parallels may ascertain the error of his barometer, aneroid, or sympiesometer, to nearly three-hundredths of an inch, and this without incurring risk by moving the instrument, and without any trouble beyond making the usual observations."*

MEAN HEIGHT of the BAROMETER in the SOUTHERN HEMISPHERE.

Lat. 0° to 5° S. - 29·94 inches.	Lat. 40° to 43° - 29·88 inches.
5 to 10 S. - 29·28 "	43 to 45 - 29·78 "
10 to 15 S. - 30·03 "	45 to 48 - 29·63 "
15 to 20 S. - 30·06 "	48 to 50 - 29·62 "
20 to 25 S. - 30·10 "	50 to 53 - 29·48 "
25 to 30 S. - 30·09 "	53 to 55 - 29·36 "
30 to 36 S. - 30·05 "	56½ - 29·29 "

Hence, it will be seen that a low barometer is common to all the southern regions ; and, since the mercury in every place is lower in the rainy season than in the dry season, this low barometer may be ascribed to the effects of the moisture supplied to the air by the immense surface of ocean on the polar side of 40° S.

Gales of wind frequently occur in the high latitudes of the South Atlantic, when the barometer is above its mean, as they do in the North Atlantic. Generally speaking, on the east and south coast of South America, northerly winds depress the barometer, and it falls most with a N.N.W. wind ; it rises higher with a S.E. than with S.W. winds ; also, as it rises shortly before a shift of wind, the time when the fall ceases and the rise begins should, therefore, be noted.

S.E. and S.W. winds affect the barometer in the same way as N.E. and N.W. winds do in the British seas ; while N.E. and N.W. have effects similar to our S.E. and S.W. winds respectively. The mercury stands highest with S.E. and lowest with N.W. wind ; if it falls to 29 or 28·80, a S.W. gale may be expected, but does not commence until the column has ceased to descend ; it frequently, however, falls without being followed by this change.

* Admiral FitzRoy, 1857.

In 1,429 gales south of the parallel of 40° S., 195 were between north and east, and the mean of the barometer 29·46 inches; 84 between east and south, 29·43 inches; 502 between south and west, 29·39 inches; and 648 between west and north, 29·31 inches. Thus, between north and east, 14 per cent.; between east and south, 6 per cent.; between south and west, 35 per cent.; and between west and north, 45 per cent., which is the stormiest quarter in this region.

The TEMPERATURE of various places along the coast of Brazil is as follows:—At Pará and Maranhão the mean is about 76° at night to 84° in the day, and sometimes it reaches to 95°; at Pará the temperature during three years only once reached 95°; the greatest heat of the day, about 2 p.m., ranges generally between 89° and 94°; the air is never cooler than 73°, and the mean of the year is 81°; at Ceará it ranges from 83° in the coldest to 95° in the hottest months; at Pernambuco it varies from 77° to 86°, with a slight decline in the rainy season; at Bahia from 75° to 85°; at Rio de Janeiro it is a little less than at Bahia, and the mean temperature for 30 years is stated to be 74°. At Santa Catharina it descends to 54° during the winter months, in June and July; and at Rio Grande do Sul, during the same months, to 44° and 40°; and it rises to 88° in summer. In the La Plata it ranges from 32° to 88°, the mean temperature being about 65°.

From the construction of modern ships, wherein so large an amount of iron is introduced, the various causes which affect the mariner's compass become of importance to navigation; and no Sailing Directions comprehending the large space given in the South America Pilot can be considered complete without some knowledge of the magnetic elements of the portion of the globe so described, and of the changes which they are undergoing, affecting, as these elements do in a greater or lesser degree, the navigation of all vessels. We have therefore given in a condensed form some general information on their leading features.*

The VARIATION of the COMPASS within the limits of the South America Pilot (that is, from Cayenne in Guayana to Cape St. Roque, and from thence to Rio de la Plata in Part 1; and from Rio de la Plata to the Bay of Panama, including Magellan Strait, the Falkland, and Galapagos Islands in Part 2), ranges from 9° W. at Cape St. Roque to 23° E. at the south extreme of the continent of America, and from thence decreases to 7½° E. in the Bay of Panama.

* Staff Commander F. J. Evans, R.N., F.R.S., Superintendent of Compasses, Admiralty.

As the variation of the compass for various places will be found at the head of each chapter, and annexed to the Table of Positions, it is only necessary to briefly describe here the general features of its distribution.

The line of no variation (or where the compass points *true* North), crosses the Atlantic Ocean about 90 miles N.E. of Guadaloupe and Barbados islands, in a N.W. and S.E. direction, and touches on the coast of French Guayana near the settlement of Cayenne; it then takes a S. by E. direction, passing through that part of the South American coast 100 miles W.S.W. of Rio de Janeiro near San Sebastião.

Eastward of the line of no variation, the variation is *Westerly*, the general direction of the lines of equal value being N.N.W. and S.S.E. (*true*), increasing in amount at equal distances to 9° West at Cape St. Roque. Westward of the line of no variation, the variation is *Easterly*: the lines of equal value then gradually assume a N.W. and S.E. (*true*) direction, and increase on the eastern coasts of the continent to 23° E. at Cape Horn; decreasing on the western coasts from thence to 7½° E. in Panama bay.

The annual change of the variation of the compass averages about 5' on the whole eastern shores of the South American continent from the river Amazon to Cape Horn; westerly variation *increasing*, easterly variation *decreasing*. The change is less marked on the western shores of the continent, there being only an *increase* of about 1 or 1½ minutes annually on the coasts of Chili and Peru, and apparently less proceeding northward to Panama bay.

The MAGNETIC DIP of the needle within the limits of the South America Pilot ranges from 32° N. to 58° S.; the lines of equal amount throughout the whole continent, if traced on a chart, run nearly parallel to each other in a general W.N.W. and E.S.E. direction. Thus,—

The line of 30° N. dip passes near Cape do Norte of the Amazons and the south part of Panama gulf.

20° N.	„	Cape St. Roque and Port Tumaco the boundary town of Nueva Granada.
10° N.	„	River Itapicuru north of Bahia and Guayaquil.
0	„	Abrolhos isles and Huanchaco road near the city of Truxillo.
10° S.	„	Rio Janeiro and Port San Juan.
20° S.	„	Santa Catharina island and Mexillones bay.
30° S.	„	Cape S. Maria (Rio Plata) and Copiapō.
40° S.	„	Rio Negro and Arauco bay.
50° S.	„	Port Desire and Chonos Archipelago.
57° S.	„	S.W. extreme of Tierra del Fuego.

The practical effect on the mariner's compass in wood-built sailing vessels (and in some propelled by steam), resulting from the changes in the magnetic dip, is to change the values of the deviations due to the iron of the ship nearly proportional to the *tangent* of the values of the dip.

For example, a maximum deviation of 10° , determined in the British channel, where the dip is $68\frac{1}{2}^\circ$ N., and its *nat. tan.* is 2.5; will, on the ship's attaining the parallel of Cape St. Roque, where the dip is about 20° N. and its *nat. tan.* 0.35, be reduced to nearly one-seventh of its original amount. In crossing the magnetic equator, or line of no dip, the deviation of the compass will nearly vanish (a small value remaining on the N.E., S.E., S.W., and N.W. points); on proceeding southwards, the deviation of the compass will again increase, but with the direction reversed, that is, easterly deviations in the northern magnetic hemisphere will become westerly, and in the south magnetic hemisphere, westerly deviations will become easterly.

When off Cape Horn, where the south dip is 58° and its *nat. tan.* 1.6, the maximum deviation will then be $6\frac{1}{4}^\circ$, to again decrease as the ship proceeds to the northward along the western coast of South America and approaches the magnetic equator.

MAGNETIC INTENSITY.—The earth's *horizontal* magnetic intensity, or force, is also an element influencing compass action on board ship; its value in the limits described in the South America Pilot varies from 2.1 in the gulf of Panama, to 1.6 on the coast between Rio de Janeiro and Rio de la Plata, the Falkland islands, and Cape Horn; on the coasts of Chili ranging from 1.7 to 1.8; and on the coasts of Peru from 1.9 to 2.0; the force in the British channel in corresponding measure being considered 1.0.

In numerous iron vessels, the magnetism of which has assumed a permanent character, their compass deviations generally vary inversely as the horizontal force, instead of proportionally to the tangent of the dip; that is, the maximum deviations would, on the coast of Panama, in accordance with the values above given, be lessened to about one-half the amount which existed in the British channel, and on the eastern coast of South America to about one-third.

In other iron vessels, (especially in those newly built,) and in wood-built steam vessels in the construction of which a great deal of hammered iron is employed, the change is intermediate between those which we have described.

Experience has proved the general correctness of these conclusions, and they are now offered to the seaman for his information and guidance, as indicating the nature of the changes to be expected in his compass deviations according to the structure and fittings of the ship; as also to point

out the necessity of repeated observations being made to test the compass deviations especially when navigating near the coasts herein described.

PENEDO de SAN PEDRO, called also St. Pauls rocks, is a group of rugged rocks in lat. $0^{\circ} 55' 45''$ N., and long. $29^{\circ} 21'$ W., lying N.N.E. and S.S.W. about a third of a mile in extent, the highest part being 64 feet above the sea. They are whitened from the presence of birds, by which they are covered, and may be seen from a distance of about 8 miles, sometimes appearing like sails. They are steep-to, having 47 fathoms at a little more than 2 cables from the south-west rock, and 25 fathoms at about half that distance ; but no bottom with 50 fathoms at 2 cables from the northern end, or on the eastern side at three-quarters of a cable.

There is nothing, it will be observed, to indicate the approach to this remarkable group but a vessel's correct position, and although the rocks are accurately placed in the charts, yet lying in the track of many outward-bound vessels crossing the equator, a good look out, making due allowance for the current, is actually necessary. There is landing in a cove on the north-west side ; fish called groupas may be caught in abundance, and sharks are numerous.*

The **CURRENT** in the vicinity of St. Pauls rocks sets about W.N.W., a mile an hour ; but it has been found to change its direction nearly to north, and to increase its rate to the westward to nearly 4 miles an hour.†

FERNANDO NORONHO is about $4\frac{1}{2}$ miles in length, N.E. by E. and S. W. by S., and its greatest breadth $1\frac{1}{2}$ miles ; it is hilly uneven land, and on its northern side is a remarkable peak called the Pyramid, rising to the height of about 800 feet above the sea, barren and rugged, which seems to lean to the eastward and overhang its base, when bearing S.S.W., and may be seen in clear weather from a distance of more than 30 miles ; at the south-west point is a place named the Hole-in-the-wall, the land being perforated.

The island is thickly wooded, but the trees are only from 6 to 12 inches in diameter, the most common being the *Bara* ; and on the north side, eastward of the peak, in Peak bay, is a small village built in the form of a square ; there is also accommodation for 200 soldiers and the exiles from Brazil, for which this island has long been used. The island produces Indian corn, cotton, and cocoa-nuts, but only to a small extent ; the employment of the people consists principally in fishing from the shore, no boats being allowed on the island.‡

* See Plan:—Penedo de San Pedro, or St. Pauls Rocks, No. 1,397, scale, $m = 3$ inches.

† R. W. Millar, Master, H.M.S. *Pearl*. May 1840.

‡ See Plan:—Fernando Noronho, No. 388, scale, $m = 2\frac{1}{2}$ inches.

Off the north-east part of the island are 6 small islets ; the largest and outermost, named Rat island, is about a mile in length, and its eastern point is 2 miles from Fernando Noronho, making the whole group about $6\frac{1}{2}$ miles in extent. There are also two small islets about a mile from the eastern part of the island, and several along the south-east side, within a quarter of a mile of the shore. From Tobacco point, the south-east extreme, a reef extends seaward more than a quarter of a mile ; and a rocky patch, on which the sea always breaks, lies S.E. $1\frac{3}{4}$ miles from the point, with 9 to 14 fathoms between ; when on the rocks the Pyramid is shut in with the highest hill. A rock lies about a quarter of a mile off the south-west end of the island.

The dry season at Fernando Noronho commences in July and ends in November, and the wet season is from January to June. In the first three months of the rainy season thunder and lightning is common, and heavy surfs prevail, especially at Rat island. In the dry season there is, at times, a very scanty supply of water, but in the wet season a little deluge.*

Supplies.—Water is scarce in the dry season and when procurable cannot always be got from the shore on account of the surf. Wood may be obtained either from Rat or the main island, but there is difficulty in shipping it, and it is infested with centipedes and other insects. The island is supplied with provisions from Brazil but at times they are scarce.

Anchorage.—The roadstead is on the north side of the island eastward of the Pyramid, and sheltered from easterly winds by the islets off the north-east end. Anchor with the peak bearing S.S.W. or S.W. by S. in 13 to 17 fathoms, sandy bottom, about half a mile from the shore, no soundings will be obtained until close in. This anchorage is unsafe with northerly or north-west winds which prevail from December to April ; at other times they are south-east, easterly, or north-east.

The ROCCAS.—This dangerous coral reef extends 2 miles east and west, and $1\frac{3}{4}$ miles north and south ; it lies on the parallel of Fernando Noronho, and the east end is 82 miles from the peak of that island. The reef is in general level, but the centre forms a lagoon, having from one to 4 feet water at low tide, the deeper parts being interspersed with patches of sand ; the whole of the reef is covered at high tide, with the exception of two sandy cays at the west end, which are then about 6 feet above water, and some scattered rocks on the southern and eastern sides, one of which, at the east end, 12 feet high, is remarkable. In 1857 a beacon

* Voyage of the *Chanticleer*, 1830.

33 feet high was erected on the southern cay, and several cocoa-nut trees planted by the crew of H.M.S. *Siren*.*

Heavy breakers mark the position of the reef, and particularly at the east end; and the remains of many wrecks are scattered over the cays. There is good landing on the reef abreast the northern cay, from three-quarters ebb to a quarter flood, and at high water just southward of the northern cay. Fish of excellent quality can be caught in the lagoon. There are soundings in 15 fathoms, rocky bottom, at 6 miles, and 13 and 14 fathoms at 3 miles eastward of the reef, and 28 fathoms 2 miles westward; but no bottom with 30 fathoms at $2\frac{1}{2}$ miles N.N.E., nor with 70 fathoms at 4 miles S.W. of it.†

Anchorage.—There is anchorage at about half a mile off the north-western part of the reef, protected from the swell in 8 or 9 fathoms, sand and coral; the latter is easily avoided as the bottom is plainly seen.

CURRENT and TIDES.—The current in the vicinity of Fernando Noronho and the Roccas sets strong to the westward; at 2 miles westward of the latter it has been found to run $2\frac{1}{2}$ miles an hour. The many wrecks that have taken place on the Roccas is sufficient to prove to the mariner the necessity of caution when in the vicinity of this dangerous reef. It is high water at the Roccas, full and change, at about 5h. 15m., and the rise is 10 feet.

* Captain J. H. Selwyn.

† See Plan of Roccas on Chart, South America, Sheet 4, No. 528, scale $d = 3\cdot0$ inches.

CHAPTER II.

CAPE ST. ROQUE TO BAHIA.

VARIAION.—9° 30' West to 6° 10' West in 1864.

CAPE ST. ROQUE.—From Touro point, the north-east extreme of Brazil, the coast takes a S.S.E. direction for 23 miles to Cape St. Roque, a slightly projecting point of white sand, with a few scattered tufts of brushwood on it. There are several small red cliffs near the cape, but which show only when the sun shines on them; and to the northward the land declines in height. Between the point and the cape the shore forms several bays, and is composed of white sandy downs, interspersed with dark green brushwood, cocoa-nut trees, and small villages. At the distance of 15 miles from Touro point is the low point of Pititinga with the bay and village of the same name on its north side.

The coast between Pititinga point and the cape is skirted by a reef, which, between 2 and $2\frac{1}{2}$ miles southward of the former, in front of two small villages, forms a curve with its outer edge more than a mile from the shore, having $2\frac{3}{4}$ fathoms water inside it. The chapel and village of Touro, south of the point, stands on the north side of the river of the same name. At a mile northward of the village of Pititinga is the little river of Guaxinim, and at $1\frac{1}{4}$ miles farther on in the same direction is the rio Punahú, from which to the Touro the shore is skirted by reefs extending off the Punahú nearly a mile.*

BANK of ST. ROQUE.—The coast from Cape St. Roque, northward to Touro point, and from thence westward, is bordered by a bank with irregular depths and numerous dangerous reefs. The bank at about 13 miles eastward of the cape, trends northward through the meridian of about 35° 5' W. at its north-east extreme, and then curves westward in lat. 4° 45' S.

The SOUNDINGS along the whole coast of Brazil, from Cape St. Roque as far south as St. Catharina island, are either too deep or uniform to place much reliance on them in approaching the land; there are, however, places where the timely use of the lead will indicate

* See Charts :—Touro Point to Formósa, No. 889, scale $m = 0\cdot4$ of an inch; Index Chart, No. 1,800; and South America, Sheet 4, No. 528, scale $m = 0\cdot05$ of an inch.

danger. At about 14 miles northward of Touro point, the north-east extreme of Brazil, there are only 15 and 16 fathoms water, and at the same distance farther north no bottom with 60 fathoms; at 15 miles eastward of the point, there are 15 to 17 fathoms; and at the same distance from the land farther southward there are from 17 to 21 fathoms. Off Cape St. Roque, at the distance of 8 miles, there are 15 and 16 fathoms; and at 30 miles eastward no bottom with 40 fathoms.

Off rio Grande do Norte, at 5 miles from the lighthouse, there are 10 and 11 fathoms, and from thence to the river Parahiba, at from one to 5 miles off shore, there are from 6 to 15 fathoms. From Pernambuco to Bahia there are generally from 12 to 18 fathoms at about 5 miles from the land, and not less than from 27 to 35 fathoms water at 27 or 30 miles off; at 30 miles from the mouth of the rio San Francisco the depth is about 45 fathoms; at 60 miles from the rio Vazabarris or Sergipe, and rio Real, it is upwards of 170 fathoms; at 27 miles east of the inlet of Itapicuri the depth is 180 fathoms; and 97 miles east of the tower of Garcia de Avila at about 40 miles north-east of Cape St. Antonio, the depth is not less than 160 fathoms. At 25 miles south-east of Cape St. Antonio there is no bottom with 100 fathoms, nor with 100 fathoms 12 miles southward of it.

On the parallel of the morro St. Paulo, at the distance of 27 miles from it, there is no bottom with 110 fathoms. On the bank extending eastward from the Abrolhos isles, the soundings vary from 15 fathoms at 10 miles eastward of the rocks to 45 and 17 fathoms at its eastern part on about the meridian of $37^{\circ} 5' W.$, when the water suddenly deepens to upwards of 230 fathoms. From the above meridian and the parallel of $18^{\circ} S.$, the bank forms an irregular curve to the westward and southward to $20^{\circ} S.$, having from 31 to 50 fathoms at about 100 miles from the land, with deep water between the projections of the bank, and outside it; and in lat. $19^{\circ} 32' S.$, at the above distance from the land, there is no bottom with upwards of 900 fathoms.

Between the meridians of $37^{\circ} 10'$ and $38^{\circ} 18' W.$ and the parallels of $20^{\circ} 30'$ and $20^{\circ} 55' S.$ is the Victoria bank, having from 19 to 40 fathoms water, with upwards of 190 fathoms between it and Espirito Santo bay. To the south of the bank, nearly on the meridian of its western edge, and in lat. $21^{\circ} 25' S.$, there is no bottom with 1,000 fathoms. At the distance of 50 miles eastward and south-east of Cape St. Thomé there is no bottom with 100 fathoms; inside this distance the bank north of the cape has irregular depths, varying from 7 fathoms, at about 25 miles north-east of the cape, to 65 and 100 fathoms at less than 50 miles from it. To the south-west of the cape, between it and Cape Frio, the depths vary from 16 to upwards of 50 fathoms.

About 70 miles eastward of Cape Frio, there is no bottom at 100 fathoms, nor at 35 miles south of it. At about 55 miles south-east of the entrance to Rio de Janeiro there are 75 fathoms, and immediately outside this distance no bottom with 100 fathoms; at about 60 miles south of St. Sebastião island there are 65 fathoms; at 100 miles eastward of Paranagua bay or inlet there are 63 and 66 fathoms; and about 55 miles eastward of Santa Catharina island there are 62 fathoms.

Between Santa Catharina and Cape Santa Marta, at the distance of 30 miles from the land, the depth is from 50 to 62 fathoms; on the parallel of 30° S., at the distance of 65 miles from the land, the depth is 62 fathoms; and on the parallel of Rio Grande do Sul, at the distance of 55 miles there are 34 fathoms, and at the distance of about 30 miles south-east of it there are 18 and 20 fathoms.

CURRENTS.—It has already been observed at page 11, that the currents along the coast of Brazil vary according to the force and direction of the wind or monsoons, and the inclination of the land. The wind being always from the north-east and south-east quarters, causes the water as it runs along the land to have a general tendency to the westward. Its velocity varies on different parts of the coast, and is greater in the southern monsoon when the winds are stronger than in the northern. In the southern monsoon the current sets to the northward, generally inclining to the westward, according to the direction of the wind, and runs along the coast, increasing its rate as it proceeds to the northward.

It runs occasionally more than 2 miles an hour,* and increases its force as it advances to the north-west round Cape St. Roque. Care should be taken to guard against the westerly set, particularly in proceeding to the southward, inasmuch as a vessel steering along or obliquely towards the land, and the current taking her on the port bow must inevitably set her towards it.† In the northern monsoon they are generally very strong to the southward of Cape St. Agostinho, and near the salient points, such as the cape, the rio Doce, and Capes St. Thomé and Frio; when they are weak to the northward.

With the exception of about the three summer months of November, December, and January, when the N.E. winds are in full force, and when vessels are sometimes carried from 36 to 40 miles to the southward in 24 hours, the currents become weak and variable and cease with the cause which produces them. During the S.E. monsoon the northerly current acquires its full force in June and July; at other times it is weak and variable.

* Mr. John Scott, Master, H.M.S. *Euryalus*, June 1860. See also page 231.

† In 1859 three vessels were ashore northward of Parahiba; the master of one of them at the time she struck supposed himself 30 miles from the land.

There is often near the shore under the lee of the capes, such as south of Capes St. Thomé and Frio, counter currents to the N.E.; when at some miles seaward they run to the S.W. Along the coast of Pernambuco there is likewise, sometimes, a counter current which sets with some force to the northward, which is often the cause of vessels when becalmed missing the land intended to be made.

The TIDES are pretty regular, but the little sinuosities of the coast, the absence of gulfs and channels, cause their influence to be only felt by vessels in entering and leaving the ports; at one or 2 miles from the shore they are not felt. The establishment of the whole eastern shore of Brazil varies but little, as the coast lies nearly in a straight line, and parallel to the tide wave which traverses the Atlantic ocean from E.S.E. to W.N.W.

This tide wave meets all this part of the continent nearly at the same time. At St. Catharina it is high water at 2h. 45m.; at Rio de Janeiro 2h. 58m.; at Bahia 4h. 15m.; at Pernambuco 4h. 30m.; and at Ceara 4h. 30m.; but from this latter point the current along the coast runs to the westward with the tide wave, and the time augments rapidly. It is high water at Maranham at about 7h., and at Pará at 12h.

ASPECT.—From Cape St. Roque southward the whole coast is composed of low sandy downs, rising to a moderate height towards Olinda point, and then resuming generally its former aspect to the southward, which will be treated on hereafter. From the parallel of 20° S. or about 180 miles northward of Cape Frio, as far south as the island of St. Catharina, the land is generally high, wooded, and may be seen from a distance of upwards of 50 miles.

The RECIFE, a singular ridge of coral rock, borders the coast generally at the distance of about half to 3 miles, but in places much farther off, and extends more or less from the north-east point of Brazil, as far as Bahia; traces of it may be found more to the southward, and along the north coast to Maranham. The reef, which is about 16 feet in breadth at the top, slopes off to seaward, is perpendicular on the shore side, and said to be generally covered, but sometimes rises from distance to distance nearly 3 feet out of water. It is nearly always bordered by rocky banks, and forms a natural breakwater, having smooth water and shallows inside it, with navigable channels for coasters, and where fish may be caught almost throughout the year. It is broken occasionally, and forms by the openings entrances to the greater part of the ports, rivers, and creeks on the coast.

ESPARRACHE de MARACAJAHU.—At $6\frac{1}{2}$ miles N.N.E. $\frac{3}{4}$ E. from Cape St. Roque is the southernmost of three rocky patches, called Esparrache de Maracajahu, which uncovers at certain times of the tide

and extends over a space of $1\frac{3}{4}$ miles. From it the recife runs to the southward for 3 miles, with only from two-thirds to one fathom water on it, then for $1\frac{3}{4}$ miles farther on until the cape bears W. by S. $\frac{2}{3}$ S. with $2\frac{3}{4}$ fathoms, when it deepens to $7\frac{1}{2}$ fathoms. From the northern patch the recife extends in that direction for nearly 3 miles with from two-thirds to $2\frac{3}{4}$ fathoms over it.

Close along the east side of this dangerous reef there are 6 and $7\frac{1}{2}$ fathoms, and 5 miles seaward 19 fathoms. Its inner part is bordered by a flat having from one to $1\frac{1}{2}$ fathoms water over it with several shoaler patches; it extends towards the shore for more than 2 miles, leaving a passage of $1\frac{3}{4}$ miles in breadth, between it and the reefs skirting the coasts.

CHANNEL of PITITINGA.—At nearly $1\frac{3}{4}$ miles northward of that part of the recife extending from the Esparrache de Maracajahu, is the south end of another portion which runs to the northward at 6 miles from the coast. This break in the recife, called the Barreta da Pititinga, is clear of danger, carries from 4 to 7 fathoms water, leads into the channel of St. Roque, and to the anchorage in Pititinga bay. Should a vessel have occasion to use this passage, which lies with Pititinga point bearing S.W. by W., it will be necessary to keep rather on the south side to avoid the shoals bordering the inner part of the northern reefs.

The Northern Portion of the RECIFE runs to the northward from the channel of Pititinga for $18\frac{1}{2}$ miles, terminating on the parallel of $5^{\circ} 1' S.$ It is uncovered in one or two places, only at low water, but otherwise has from two-thirds to 2 fathoms water over it, and broken in three places, leaving narrow passages into the channel of St. Roque. The two southernmost carries from $2\frac{1}{3}$ to $2\frac{3}{4}$ fathoms water; but the northern passage, called the Barreta dos Touros, which lies with the village of Touro bearing about W. by S. $\frac{1}{4}$ S., is larger and has $4\frac{1}{2}$ fathoms.

All along the north-east side of these dangers, there are 7 to 8 fathoms water close to, and 15 to 17 fathoms at 5 miles off. On the north-west extreme of the reef there are 3 fathoms water, and $8\frac{1}{2}$ and $9\frac{1}{2}$ fathoms close to, whilst to the northward and to the eastward at the distance of 5 miles there are $13\frac{1}{2}$ fathoms.

CHANNEL of ST. ROQUE.—The above portions of the recife extend along the coast in a N.N.W. direction for about 28 miles, at a distance of 6 miles at its south extreme, and 9 miles at its northern, forming the channel of St. Roque. The interior part of the recife is bordered by numerous banks having from two-thirds to $1\frac{1}{2}$ fathoms water over them, leaving between them and the reefs skirting the shore a clear channel of more than a mile in breadth, carrying 17 feet water.

At a distance of 2 miles eastward of Cape St. Roque, steer along the

coast to the north-west at about the same distance, in from $5\frac{1}{2}$ to $3\frac{3}{4}$ fathoms water; when about 6 miles northward of the village of Pititinga and past some hills called the Barreiras do Inferno, close the shore a little, or to a distance of about $1\frac{1}{4}$ miles, but not into less than about 3 fathoms, which is the least depth in the fairway of the channel.

When off the village of Fogo, at $1\frac{1}{2}$ miles farther on, with two or three cocoa-nut trees on either side of it, a vessel will be in the narrowest part of it, and the water will begin to deepen. There are no dangers to the north-west of this at a mile from the shore. Temporary anchorage will be found for vessels of light draught northward of Cape St. Roque in 17 feet water; in Pititinga bay in the same depth; and off the little bays to the north-west.

URCA do COTIA.—At $26\frac{1}{2}$ miles N.W. $\frac{1}{4}$ N. from Touro point and $12\frac{1}{2}$ miles from the shore, on the parallel of $4^{\circ} 51\frac{1}{2}'$ S., is the Urca do Cotia ou Cabôclas, the easternmost of the group of shoals bordering the coast westward of Touro point. At $3\frac{1}{2}$ miles northward of it there are 29 fathoms water, and at a mile from it 11 fathoms. A bank a mile in breadth extends from it to the eastward for $6\frac{1}{2}$ miles, having from $5\frac{1}{2}$ to 7 fathoms water over it. From this shoal to a mile from the shore there are no other dangers, and the soundings decrease from $8\frac{1}{2}$ to $3\frac{3}{4}$ fathoms.

COROA das LAVADEIRAS.—At 3 miles W. $\frac{1}{2}$ S. from the Urca do Cotia is the east end of the Corôa das Lavadeiras, having from $7\frac{1}{2}$ to $9\frac{1}{2}$ fathoms water between them. This end of the shoal is $1\frac{1}{2}$ miles in breadth, from whence it curves to the westward and southward for about 16 miles in the form of a hook or scythe, and terminates in a point at $3\frac{1}{4}$ miles from the coast. The eastern and western parts of this shoal has from $1\frac{1}{2}$ to $2\frac{3}{4}$ fathoms water on it, but the central part for more than $3\frac{1}{2}$ miles uncovers at certain times of the tides.

This central part lies about $8\frac{1}{2}$ miles northward of Tres Irmaôs point. Between that part of the shoal forming the hook and the coast are numerous shallow banks having from about a half to $1\frac{1}{2}$ fathoms on them with $2\frac{3}{4}$ fathoms between them. Between these shoals and the shore there is a channel carrying 17 feet water and about one-third of a mile in breadth.

URCA da CONCEICAO.—This cluster of rocks, extending east and west for $1\frac{1}{2}$ miles, lies north-westward of the shoal part of the Lavadeiras in lat. $4^{\circ} 51'$ S., and N. $\frac{1}{4}$ W. 12 miles from the village of Caicara. The Pedra Secca, a patch with $2\frac{1}{4}$ fathoms on it, is 3 miles southward of it and about the same distance westward of the central part of the Lavadeiras. At nearly $2\frac{1}{4}$ miles westward of the Pedra Secca is a very narrow ridge called the Risca das Bicudas with one to $1\frac{1}{2}$ fathoms on it, which runs straight to the westward for 5 miles.

URCA do MINHOTO.—This shoal, more than $1\frac{1}{2}$ miles in length, is 10 miles westward of the Conceição, nearly on the same parallel, and uncovers at certain times of the tides. It lies about N.W. $\frac{1}{4}$ N. nearly 17 miles from the village of Caicara, and 14 miles from the coast. At $1\frac{3}{4}$ miles eastward of it is the Oliveira with $2\frac{1}{4}$ fathoms on it. These reefs always break, but more so when the wind is from seaward. At about $11\frac{1}{2}$ miles westward of the Minhoto shoal, on the meridian of Tubaraõ point and nearly 12 miles from it, is the west end of a rocky shoal of the same name with $2\frac{3}{4}$ fathoms water on it.

There is nothing to indicate a vessel's approach to the vicinity of any of these banks, but astronomical observations and the soundings: the bottom is white sand, coral, and gravel. The water near the edge of the bank is green, and contrasts strongly with the water outside it. The green water, unless in a small vessel bound inshore, should never be entered; the depths decrease suddenly from 18 to 8 fathoms, or less. The land being low can be seen only in fine weather from a distance of 10 to 12 miles; no vessel, unless very certain of her position, should approach it nearer than 35 miles. The current runs strong to the W.N.W. and N.W. The rise of tide on the banks at springs is nearly 10 feet, and at neaps 6 feet.

Having given a description of the dangerous reefs bordering the north-east extreme of Brazil, we now resume the pilotage of the coast from Cape St. Roque to the southward.

THE COAST, from Cape St. Roque, runs about S. $\frac{1}{2}$ E. for $14\frac{1}{2}$ miles to Genipabú point, at 3 miles northward of fort Santos Reis Magos, on the south side of entrance to the rio Grande do Norte. At 3 miles from the cape is the rio Maxaranguápe, with a small village and some cocoa-nut trees on its north point of entrance. At $2\frac{1}{2}$ miles south of the latter is another village, and about $1\frac{1}{2}$ miles farther on that of Jacumum. The rio Ceara-mirim disembogues at $1\frac{3}{4}$ miles north-west of Genipabú point, having a village between. The shore from the rio Maxaranguápe is interspersed with groups of cocoa-nut trees, and bordered at the distance of about three-quarters of a mile by the recife. At about 2 miles from the coast there are 7 or 8 fathoms water. The Baixo Genipabú lies at rather more than three-quarters of a mile south-eastward of that point.

RIO GRANDE do NORTE.—The entrance to this river, called by the Brazilians Pontangi, is formed by an opening in the recife which covers its mouth. The southern ridge extends northward from the south point of entrance to the distance of three-quarters of a mile, leaving a passage having 23 feet water between it and the reef to the north. Within the outer reefs a smaller ridge of 2 cables in length, running in the same direction, rises from the bank on the north side of entrance, with its southern end bearing West, distant 2 cables from the north end of the

southern ridge, and 4 cables from the shore. Inside the reefs the channel is subject to great changes, and is now much contracted, with a depth of 14 feet over the bar at low water.

The river from the entrance to abreast the town is from 2 to 3 cables in breadth, with depths of $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms. The rio Grande is a considerable stream during the rainy season, but is much reduced in the dry season, and at about 3 miles above the town its course is obstructed by a sand-bank, having only $1\frac{1}{2}$ fathoms water over it. At high water the northern bank is overflowed about one mile from the mouth. The entrance is defended by fort Santos Reis Magos, an angular structure, standing in the middle of the southern reef, and insulated at high water. The rise of tide at springs is from 8 to 10 feet.*

NATAL, the capital of the province of Rio Grande, stands on the eastern bank of the river, 2 miles within the entrance, and has a population of about 11,000. Its exports are cotton, sugar, dye-wood, and most of the articles that are exported from the other ports in the Brazil. Fresh beef and vegetables are plentiful, and at moderate prices.

LIGHT.—At the entrance of rio Grande do Norte, on fort Santos Reis Magos, is a round tower which exhibits, at the height of 43 feet above the sea, a *fixed* white light, said to be visible in clear weather from a distance of 12 miles.

DIRECTIONS.—The land in the vicinity of the rio Grande do Norte is very low, and there is nothing to indicate the entrance to the river, but the fort and lighthouse on the southern reef, which may be seen at a distance of several miles. Vessels bound for this port should make the land to the southward, as the current sets strong to the northward; should wait for slack water to enter, and on no account attempt it at the commencement of the ebb, which runs out very strong, and if care is not taken may set a vessel on the northern reef.

Steer for the extremity of the southern reef, leaving it on the port hand, and then to the southward of the inner reef; when clear of the latter, keep on to the westward until close inshore, giving the south point a wide berth; the depth will decrease to 16 and 14 feet. Having rounded the inner point follow the middle of the river, and anchor abreast the first house in the town, in about $4\frac{1}{2}$ fathoms water. As the channel is narrow, and constantly changing, no stranger should attempt to enter without a pilot.

The COAST.—From the rio Grande do Norte, the white sandy shore runs to the southward for 16 miles to Cotovello point. Midway is

* See Plan of Rio Grande do Norte, scale $m = 2$ inches, on Chart of South America, No. 528; and Views—Coast of Brazil, No. 2,522.

Ponta Negra with some rocks extending to the northward for about half a mile ; and $1\frac{1}{4}$ miles north-west of it is a small village and a group of cocoa-nut trees, off which under shelter of the point there is anchorage with southerly winds.* The coast north and south of it bends a little westward, forming slight bays, which are clear of the recife, all danger, and at the distance of a mile there are from 4 to 6 fathoms water. Between Ponta Negra and Cotovello point are some red cliffs, called Barreiras do Inferno ; and between the latter point and that of Búsios at $2\frac{3}{4}$ miles to the southward, is the rio Pirangi ; the shore fronting the two points is skirted by reefs which extend off nearly $1\frac{1}{2}$ miles.

From Búsios point the coast trends to the southward for 13 miles to Moleque point, forming a bight 2 miles deep : and about 9 miles farther on is the bay and town of Formósa. At $4\frac{3}{4}$ miles southward of Búsios point is the little river Camoropim or Trahiry with the point and village of Tabatinga 2 miles north of it. At 3 miles southward of the Camoropim in the bend of the coast are a few houses with a group of cocoa-nut trees ; and $4\frac{1}{2}$ miles more to the south or $1\frac{1}{2}$ miles north-west of Moleque point is Ponta da Pipa and village. Off this point is a detached rock resembling a wine pipe on its end, from which it takes its name, and is the only remarkable point on this point of the coast.

Temporary anchorage will be found N.E. of the village, but at about a mile off the point is a shoal about half a mile in extent with $2\frac{3}{4}$ fathoms water on it. The above part of the coast from a little northward of Tabatinga point is skirted at the distance of about half a mile by the recife, which is broken, and uncovered at times. From Moleque point the shore, forming a slight bay, runs to the southward for nearly 5 miles to the mouth of the rio Cunhahú, with the hill of the same name south of it, whilst on the north side of it is the hill and river of Sibutama.

From the Cunhahú the shore trends south for $3\frac{1}{2}$ miles, and then to the eastward, forming the bay of Formosa. For nearly 3 miles north and south of the Cunhahú it is skirted by the recife at about half a mile off, and which at times uncovers.

RIO PIRANGI.—At $2\frac{3}{4}$ miles southward of Cotovello point is that of Búsos, and midway is the mouth of the rio Pirangi with a village at a little distance on either side of it. From the latter point, a reef covered at times, with several shoals inside it, extends to the northward, fronting the mouth of the river, and terminating nearly $1\frac{1}{2}$ miles off Cotovello point. There is anchorage inside it, off the village north of the river, in $3\frac{1}{2}$ fathoms water. At a mile eastward of the north end of the reef there

* Commander Boys, H.M.S. *Express*, 1854.

are $8\frac{1}{2}$ fathoms, and about 5 fathoms, at the same distance to the north-west.

The **RIO CUNHAÚ**, known by the hill of the same name on the south, and that of Sibumã on the north, is entered through a break in the recife on the north side of its entrance, having 14 feet at low water. Both entrance points are bordered by sand-banks. The river has 11 feet water at 5 miles up. A village stands on the north bank inside its mouth.

BAHIA FORMOSA, or Fair bay, formed between the mouth of the Cunhaú and Formosa point, affords, with southerly winds, anchorage in 4 and $5\frac{1}{2}$ fathoms at low water. The town of Formósa stands on the north-east face of the point forming the bay.*

The **COAST**.—From Bahia Formósa, as far south as Bahia Traiçáó, a distance of about 20 miles, the shore presents a continuous line of white sandy downs, covered at intervals with bushes; it is skirted more or less by the recife, occasionally uncovered, but in no instance does it extend beyond a mile from the shore. Between are the mouths of the rivers Sagi, Guagu P do Guagu, and Camaratubu, the latter about $5\frac{1}{2}$ miles northward of Traiçáó point, with the village of the same name standing on the north part of entrance.

At about $4\frac{1}{2}$ miles southward of Traiçáó point is the mouth of the river Mamanguápe. The coast between is marked by several small red cliffs, and at 8 miles farther south is Lucena point. From Traiçáó point, the recife, more or less uncovered, runs to the southward, covering the mouth of the Mamanguápe and passes close to the south point of its entrance; it then becomes covered, more broken, and continues close along shore until about $2\frac{1}{4}$ miles from Lucena point.

BAHIA TRAIÇAO, or Treason bay, is formed by the point of the same name, which extends eastward more than a mile. A village stands in the bay, backed by cocoa-nut trees. A shoal lies in the south side of the bay with from one to 2 fathoms water inside it. The recife, which is uncovered, passes close to Traiçáó point, and runs northward more than a mile, leaving a space of about $1\frac{3}{4}$ miles wide between its termination and the shoals at the distance of half a mile off Tamba point to the northward.

In the middle of the entrance, between the north end of the recife and the shore, is a shoal which is covered, steep-to, and may be passed on either side. The anchorage, fit only for coasters, is close inside the north end of the recife in $2\frac{1}{2}$ fathoms water.

* See Chart: —Formósa to Pernambuco, No. 890; scale, $m = 0.4$ of an inch.

LAGOA ACEMTIBIRO, or Acejutibiro, is $4\frac{1}{2}$ miles in length and one mile in breadth, having from two-thirds to $2\frac{1}{3}$ fathoms water. It is separated from Bahia Traiçáo by a narrow neck of land north of the village. A narrow passage between Coqueirmbo point and the islets southward of it at 3 miles south of Traiçáo leads into the lake. The village and church of San Miguel stand on its western side.

MAMANGUAPE RIVER is navigable for small coasters, which collect the produce of the northern parts of Parahiba for conveyance to Pernambuco. The southern entrance point of the river is low, sandy, and projects to the north-east having a village and several cocoa-nut trees along its north side. Coqueirmbo point with the village of the same name is $1\frac{3}{4}$ miles to the northward, from whence the shore trends to the west for about a mile to the entrance of a very narrow passage leading into the Lagoa Acemtibiro.

Between the south side of Coqueirmbo point and that of Mamanguápe are several small islets and shoals leaving a channel along by the south shore into the river; the bar or entrance to which is through a narrow break in the recife about $2\frac{3}{4}$ miles north of Mamanguápe point. The channel along by the recife inside it, carries from $1\frac{1}{2}$ to $7\frac{1}{2}$ fathoms water; between the shoals and the south shore the depth is about one fathom, but farther in the water in places deepens to $2\frac{1}{2}$ fathoms.

LUCENA POINT, at 3 miles northward of the entrance to the rio Parahiba, projects seaward with a village stretching along its north side for nearly a mile, backed by cocoa-nut trees. In front of the village shallow water extends off for nearly 3 miles. The point is fronted by the recife, here called the Baixos de Lucena, which after some interval recommences at 3 miles N. by E. $\frac{3}{4}$ E. from the point and nearly the same distance from the shore; it extends to the southward for upwards of 4 miles, passing $1\frac{1}{2}$ miles eastward of the point, is generally covered, and on which the sea breaks. Inside the recife surrounding the point are several shoals having between them about one fathom water, and the same depth in the channel between them and the recife. At 7 miles eastward of the point the depth is 15 fathoms, and at a mile from the breakers there are $5\frac{1}{2}$ to 7 fathoms water. At 25 miles off there are 29 fathoms.*

PARAHIBA RIVER rises in the Borboréma mountains, on the confines of Pernambuco and Parahiba, flows for about 300 miles, north-east and east, through the latter province, and falls into the sea by two mouths. During summer the bed of the river becomes dry about 60 miles from the sea. The town of the same name, and capital of the province, stands

* Captain Phillimore, H.M.S. *Curaçoa*, 1859.

on the right bank of the river about 12 miles from the entrance. The most important public buildings are—an old college, now the governor's residence, house of assembly, courts of law, custom-house, town-hall, numerous churches and convents, an hospital, and barracks. There is also a college and elementary schools. Population about 17,000.

The exports consist of cotton, sugar, rum, woods, hides, gums, oils, and various other articles. In 1857 the total value of exports was 503,254*l.*; and in the same year 54 British vessels cleared inwards with cargoes valued at 22,813*l.*; and 55 British vessels cleared outwards with cargoes valued at 409,824*l.*, the aggregate tonnage being 27,222 tons. A line of steamers runs between this port and Pernambuco, their route being continued along the coast to Granja, in the province of Ceara.

Extensive breakers indicate the entrance to the river, caused by the reefs surrounding it, and the shoals stretching northward beyond Lucena point. The bar is buoyed about a mile from the shore, and about 17 feet can be carried over it at low-water, but from the constant shifting of the sands it is necessary to employ a pilot. Vessels anchor within the entrance off fort Cabedello in 4 or 4½ fathoms; those of about 200 tons can go farther up, and small vessels can load off the town.*

From off Cape Branco the country to the northward appears like two plains, which on closing becomes distinctly marked. The outer plain by the sea is low and sandy, but woody on the highest part; the inner one presents a series of small woody hills of a pleasing appearance. The river flows between the two plains in a S.S.W. direction from its mouth. Ponta do Matto or Balea, the south point of entrance, is low and woody, and is the extremity of the outer plain; and just inside it is the strong fortress of Cabedello, which may be seen from the offing when bearing to the southward of West.

At three-quarters of a mile west of Ponta do Matto is the opposite point of entrance formed by the second plain; it is more elevated, and on it are some cocoa-nut trees, and a mile to the north-west is some high wooded land, on which stands the conspicuous convent of Nossa Senhora da Guia.

Supplies.—Fresh beef and other supplies may be obtained at a reasonable price, but vegetables are scarce. Water can be procured up the river.

PILOTS may be had by making the usual signals; they are expert and trustworthy, and come off in jangadas from Cocoa-nut village south of the fort. A different pilot has to take the vessel up the river, which is generally done in one tide; but, in leaving, sailing vessels have nearly always to beat out, there being little or no land wind.

* See Plan of Parahiba entrance, on Chart, No. 528.

TIDES.—It is high water at the Parahiba, full and change, at 4 h. 45 m.; and the rise of tide is said to be 12 feet.*

DIRECTIONS.—To the northward of the Parahiba, the land has no conspicuous object to mark it. During the northerly monsoon run down the latitude, keep the lead going, and do not approach the Baixos de Lucena or the reefs extending southward from them nearer than 8 fathoms until Cabedello fort is seen. During the southerly monsoon vessels should make Cape Branco, and soon afterwards the convent of Nossa Senhora da Guia, a large square white building, will be seen surrounded by trees, and apparently half way up the incline of the hill on the north side of the river. When Cabedello fort is seen bearing about West, heave-to for a pilot. At the distance of 3 miles from the Recife there are from 7 to 10 fathoms water.

CAPE BRANCO.—From Ponta do Matto the low woody shore runs south for 12 miles to Cape Branco, a clifly point of white sand, conspicuous when north or south of it, but blends with the land when seen from the offing. There are several cocoa-nut trees on its summit, and a little southward of it is the chapel of Senhora da Penha. The Recife, more or less uncovered and broken, skirts the shore at the distance of half a mile from Ponta do Matto, to rather more than a mile from the cape, with several shoals inside it and small channels between, having $1\frac{1}{2}$ to $2\frac{3}{4}$ fathoms water. At 3 miles off the cape there are 8 fathoms water, sand, oaze, and coral.

TAMBÁHU.—At about 2 miles northward of Cape Branco is the village of Tambahú, having a road leading to Parahiba, distant 5 miles. Little or no trade is carried on here beyond building the large jangadas used on the coast as passenger boats. Off the village there is convenient anchorage for vessels wishing to communicate with Parahiba without going up the river. Tambahú will be seen at a distance, with the steeples of Parahiba appearing over the hill at the back of the village.

Bring the steeples of Parahiba to bear West, run in, and anchor as convenient. A berth will be found in 5 fathoms water, with Cape Branco bearing S.S.W. $\frac{1}{2}$ W. and the centre of a group of cocoa-nut trees in the village W. $\frac{1}{4}$ S. a mile from the Recife. There is no danger, and from 8 miles off the soundings decrease from 10 to 5 fathoms.†

The COAST from Cape Branco runs nearly south for a distance of 18 miles to Coqueiros or Guia point, which will be known by its being salient or projecting seaward, whilst that of Petimbú north of it is steep. At 10 miles farther on is Pedras point, and at about $3\frac{1}{2}$ miles southward of it

* Commander Boys, H.M.S. *Express*, gives 9 feet rise at springs.

† Commander Boys, H.M.S. *Express*, 1856.

is the bar of Catuama at the north end of the island of Itamaracá. The coast all along presents sandy beaches, now and then intercepted by perpendicular red cliffs, from 20 to 60 feet high, and the mouths of several small rivers. It continues to be skirted by the Recife, but which is much broken from the cape southward, and in many places disappears.

On the parallel of the rio Abiahy, in lat. $7^{\circ} 21' S.$, the Recife rises after some interval, is uncovered at times, and again becomes more regular; and here northward of its re-commencement there is indifferent anchorage with southerly winds. From this part of the Recife as far south as the bar of Catuama, it is bordered by banks at a distance of about one to 2 miles, having over them from 2 to $2\frac{3}{4}$ fathoms water, and at 3 miles eastward of Pedras point only $1\frac{1}{4}$ fathoms, with 4 and 5 fathoms between them and the Recife. Inside the Recife there are numerous banks, which renders the navigation impracticable to any but small coasters having local knowledge.

To the northward of Pedras point is mount Almesear, which is isolated; more to the southward is that of Itapessóca, with a large quantity of cocoa-nut trees at its northern extremity; and south of it is mount Campiro, on which there are also cocoa-nut trees, with an isolated one in the centre; and between the two mounts a deep valley.

PORT FRANCEZ or PETIMBU, between Petimbú and Coqueiros or Guia points, has room only for a few small vessels, as the greater part of the space between the points is encumbered with sand banks and the bottom is indifferent. From a depth of 3 fathoms at the entrance the soundings diminish to one fathom coarse sand near the beach; outside this latter depth the bottom is soft mud, and near the Recife there are 3 fathoms coarse gravel and stones.

The entrance to the port is about 43 yards in breadth, with 4 and 3 fathoms water over fine sand. The Picão* on the north side of entrance has about 2 feet water over it, and that on the south about 3 feet. At a little distance from the picão on the north are seen two heads of rocks which uncover at low water spring tides. During summer Port Francez affords good shelter; but in the winter, as the Recife is uncovered but little, and that at the time of spring tides, the south-east winds which blow during this season cause much sea. The little village of Petimbú with its church stands in the bay.

Outside the Recife which borders the coast, at the distance of more than a mile, is the rocky bank named les Tacis (Paracel de Roussin). It extends in a southerly direction from the bar parallel to the Recife for a distance of about 3 miles, and on which there are $2\frac{1}{4}$ fathoms water.

* Picão or heads of rocks.

Between it and the Recife there are 4 and 5 fathoms, and outside it 6 and 7 fathoms. The Recife north of the bar is also bordered by a bank.

DIRECTIONS.—Port Francez will be readily known by a steep rocky well defined coast of from 25 to 30 feet high near Pimental, and from the land to the northward near the mouth of the river Abiahy being lower. Coqueiros or Guia point has a large plantation of cocoa-nut trees on it. When the southern extremity of the high part of the rocky shore in the middle of the bay bears W. b. S., and the rocky shore north of it N.W. b. W., a vessel will be in the fair way of the entrance; then steer W.S.W. until past the picão of the south, when alter course to S.W., and when the church bears N.W. steer for it and anchor inside the picão of the north in about $2\frac{1}{2}$ fathoms, muddy bottom. Nearer the shore the bottom is coarse sand, and near the Recife gravel and stones.

RIVER GOIANA.—The mouth of this river, $1\frac{1}{2}$ cables in breadth, having from $2\frac{1}{4}$ to 3 fathoms water, lies between Coqueiros and Pedras points, but nearer the former. The river is winding and falls rapidly, but is navigable for small vessels for about 10 miles, where there is one fathom water. The town of Goiana is about 12 miles from the sea, and here the river trends to the right for 9 miles farther. It receives the Tracunhaem from the south-west, and the Jacaré or Capibaribe-merim from the north-west.

The entrance is approached through a break in the Recife, from 30 to 35 yards wide, with a depth of 2 fathoms at low water springs. The picão of the north uncovers at a quarter ebb and shows more than three heads of rocks, that on the south is uncovered about 3 feet at low water springs. The channel between the banks inside the Recife leading to the anchorage has from $2\frac{3}{4}$ to $3\frac{1}{2}$ fathoms water, over sand and gravel.

DIRECTIONS.—Vessels bound for the bar of Goiana from the northward should make Coqueiros or Guia point, and steer to the southward until Guagirú point, which is sandy and covered with cocoa-nut trees at the north side of the river is seen, and which will also be known by some mangrove trees separated in the middle farther south.

Keep an isolated tree on mount Selleiro open of Pedras point until the mouth of the river is seen; then steer N.N.W. for the fair-way off the bar, the middle of which lies with Pedras point bearing S. by W. $\frac{1}{2}$ W., and Guagirú point W. by N.; and from a depth of 2 fathoms at low springs the water deepens to 3 fathoms inside the Recife, where a little to the north there is anchorage over sand and gravel. In proceeding for the mouth of the Goiana steer between the banks about S.W. $\frac{3}{4}$ S. for $2\frac{1}{4}$ miles, or until Guagirú point bears N.W. $\frac{3}{4}$ N.; then steer West, and when the point bears N.W. by N. steer to the northward for the anchorage inside the banks and near the latter point in $3\frac{1}{2}$ fathoms water, coarse sand.

In coming from the southward a vessel should make Pedras point, taking care to pass outside the shoal water on the bank fronting the recife, at more than 3 miles from the point, until Guagirú point is seen. The recife will appear open of the former point, and when it shuts in, the tree on mount Selleiro should be kept open, and then proceed as in coming from the north.

PEDRAS POINT, the most eastern extremity of the coast of Brazil, is conspicuous with a village and church on its south side. At a little more than 3 miles south-west of it is Funil point, near which is the anchorage of the bar of Catuama. Between the two points are seen the villages of Ponta Pedras and Catuama. The recife here passes at a distance of $1\frac{1}{2}$ miles. The outer edge of the banks which borders it at a distance of 4 miles from the coast, terminates with Funil point bearing N.W. by W. $\frac{3}{4}$ W. The bank at 3 miles from Pedras point has only $1\frac{1}{4}$ fathoms water over it, with 6 and 7 fathoms outside it. Between it and the recife there are $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms.

The BAR of GERIMUM.—At the distance of 2 miles S.S.E. from Pedras point is the small bar of Gerimum formed by a break in the recife northward of that of Catuama, and is more than a cable in breadth, with from 3 to 4 fathoms water, over coarse sand. The picão of the north is larger than that of the south, and has about 10 feet over it at low water; the latter has about 7 feet over it, and extends with a chain of rocks in a W. by N. direction. Within the two picãos there is good anchorage in from $2\frac{1}{4}$ to $2\frac{3}{4}$ fathoms water, coarse sand; but the space is narrow and the shore should not be approached too near, as it shoals suddenly. The narrow channel between the banks leads to an inner anchorage named Poço.

The space between the recife and the coast from Pedras point to that of Funil is filled with banks, leaving a narrow channel between them and the recife, with one to $2\frac{1}{4}$ fathoms water, which leads to the bar of Catuama. The bank outside the recife, which here terminates, leaves a clear space south of it, and near it there are from $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water.

To enter the bar of Gerimum proceed as for that of Catuama and steer to the N.N.E. between the Paracel or bank and the recife, in from 5 to 4 fathoms water. When the highest part of Itamaricá is in line with the middle of the hill of Jaguaribe, which resembles a bowl, and the cocoa-nut trees near Catuama are on with those of mount Carrapixo, steer W. by N. for the middle of the bar, which lies with Pedras point bearing N. by W. $\frac{1}{2}$ W., and Funil point W. $\frac{1}{2}$ S.

The BAR of CATUAMA, at the northern extremity of the island of Itamaricá, is larger and more convenient than those to the northward. It

leads to the rivers of Itapessóca and Tejucupápo on the main, to that of the Jaguaribe on the island, and through the channel or arm of the sea which separates the island from the mainland. It is about a mile in breadth, having from $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms water.

The channel between the banks leading from the bar to the anchorage is rather narrow, with 2 and $3\frac{1}{2}$ fathoms water, sandy bottom. The anchorage of Catuama occupies a space of $1\frac{1}{2}$ miles in length and about one-third of a mile in breadth, north and south; it is formed by Funil and Atapuz points on the main, and that of Jaguaribe on the island, with depths of $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms over coarse sand, but near Funil and Selleiro points the bottom is mud and gravel.

The Recife here passes at a distance of nearly 3 miles, and until near the picão of the north it runs in detached patches with about 7 feet over it at low water; that on the south is also broken but uncovered. Within the picão of the north is a rock named Gostoso, with $1\frac{3}{4}$ fathoms water over it; it lies with Funil point bearing W.N.W., and Pilar point S.W. $\frac{1}{2}$ W. To avoid it keep the former point northward of a W.N.W. bearing. Outside and near the picão of the south is the rock named Jaguaribe with $2\frac{1}{4}$ fathoms water over it. There is also another rock near Funil point which uncovers with the banks forming the channel.

DIRECTIONS.—The position of the bar of Catuama will be known by mounts Funil and Selleiro, on which are cocoa-nut trees. In approaching it keep at a convenient distance from the Recife, and when about 6 miles from the bar, bring mount Funil to bear N.W. by W., Pilar S.W. by W., and mount Carrapixo on with the rising sand at Atapuz point. A vessel will then be in the fairway. Then steer in about W. $\frac{1}{2}$ N. which will carry a vessel a little northward of the middle of the bar, when the cocoa-nut trees of Carrapixo will be seen between the mounts of Funil and Selleiro, and that of Itapessóca near Catuama point.

Having passed the bar, steer W. by S., taking care to avoid the Gostoso rock by keeping Funil point northward of a W.N.W. bearing. The banks bounding the channel to the anchorage are uncovered at half tide, but on which the sea breaks considerably at high water. The least depth of water is about 2 fathoms, but within the line of Pedras and Pilar points it increases. The channel is narrow and the rock near Funil point must be avoided.

RIO MEGAHÓ.—The mouth of this small river leading to the lake of Tejucupápo, lies about $1\frac{1}{4}$ miles southward of that of Goiana. It is about 140 yards in breadth, which it preserves for about three-quarters of a mile; it has $4\frac{1}{2}$ fathoms water at its mouth, and from 3 to $3\frac{1}{2}$ fathoms at $4\frac{1}{2}$ miles up when it diminishes to about 3 feet.

RIO ITAPEÇOCA.—This little river opens between Funil and Selleiro points northward of the anchorage of Catuama. Its mouth is narrowed by some rocks, beyond which it widens to 260 yards. It has from $3\frac{1}{2}$ to 4 fathoms over sand and mud, at low water, and is navigable for large boats.

RIO TEJUCUPAPO (called also Mararandúba).—The mouth of this small river, 328 yards in breadth, and which it preserves for a distance of 6 miles, with depths of 3 fathoms, at first sand, and then mud, is formed between Selleiro and Atapuz points westward of Catuama anchorage. It leads to the village of the same name at 9 miles up, and to port Ilhota.

ITAMARACA ISLAND.—The shore of this island, 8 miles north and south, is in line with the main land; it is planted with cocoa-nut trees, among which are white-washed dwellings and the cottages of fishermen. The island produces cotton, sugar, and rum; there are also extensive salt-works formed on the sand, which are overflowed at high water. At the north end of the island is the bar of Catuama, which leads into the anchorage of the same name. At 2 miles southward of the mouth of the Jaguaribe at the north end of Itamaricá, is the village of Pilar; at 3 miles more to the southward is that of Bom Jesus; and at 3 miles farther on at the south-east extreme of the island is a fortress.

The south point here terminates in a tongue of rising sand which extends in an E.N.E. direction for about half a mile, and joins the extensive bank named Macaco, fronting this end of the island. Here is an entrance formed by the usual opening in the recife leading into a channel at the south end of the island which separates it from the main. The recife fronts the island at a distance of about $2\frac{1}{2}$ miles; it uncovers at low water from the bar of Catuama until some distance southward of the village of Pilar, when it becomes covered, and continues so until southward of the bar of the island.

The rocky bank, with 2 and $2\frac{3}{4}$ fathoms water on it, continues to border the recife at a distance of 4 miles from the land, and terminates at the north side of the bar of the island with the fortress bearing W. b. S. $\frac{1}{8}$ S. distant $3\frac{1}{4}$ miles; the space between the recife and the island is obstructed by sand-banks, with passages between them having from about 3 to 6 feet water, but near the recife there are from 7 to 10 feet. A channel, from 164 to 218 yards in breadth, named Poço, runs east and west with the village of Bom Jesus, and has from $1\frac{1}{4}$ to $1\frac{3}{4}$ fathoms water over fine sand.

THE BAR of the ISLAND.—This bar, a little northward of the parallel of the fort at the south end of Itamaricá is about 18 miles from Pernambuco. The entrance is more than half a mile wide with 7 fathoms

water outside, and $4\frac{1}{2}$ fathoms water between the two picões, over coarse sand. On the south side of entrance the recife uncovers, and a little northward of it on the picão of the south are 7 feet at low water ; on that of the north there are 10 feet.

Within the picão of the south is a shoal of coarse gravel and stones which renders it necessary to keep on the north side of the entrance. Within the recife on the north is a chain of rocks running north and south which uncover, leaving between them and the recife a passage having $1\frac{1}{4}$ fathoms water, leading to the channel of Poço, where there is anchorage for small coasters.

The channel inside the bar is formed by banks of sand on either side, which leads to the anchorage of the port of the island ; it carries from $2\frac{3}{4}$ to $3\frac{1}{2}$ fathoms water over sand, but it is narrow and there is not room for any sized vessel to work out ; the deepest water is on the south side. The navigation is easy, as the sea breaks on the banks at high water, and at a quarter ebb they uncover and show the limits of the channel. After passing the fort there is good anchorage.

At $1\frac{3}{4}$ miles within is a village, and opposite on the main is the mouth of the rio Iguaçu. About the same distance farther on is the south-west extreme of the island ; here the channel trends to the north and eastward, and at the distance of 2 miles on the main is the church and village of Itapiçuma. The soundings from abreast the fort to the latter village are from 3 to $3\frac{3}{4}$ fathoms, and at the south-west end of the island the depth is only $2\frac{1}{2}$ fathoms, but 3 fathoms near the main, sand and mud. The rise of tide at springs is said to be about 9 feet.

DIRECTIONS.—Coming from the northward a vessel's position will be known by the three mounts of Funil, Selliero, and Catuama, which are to the northward of the island. In proceeding to the southward keep mount Silliero open of Jaguaribe point and when mount Ramalho is open of that of Maria Farinha at the south point of entrance to the channel the coast may be approached ; then bring mount Ramalho in line with the watch tower at the south end of the fort, until mount Selleiro is on with that of Funil, when steer for the bar.

Coming from the southward the fort at the south end of Itamaricá will be seen at some distance, and which cannot well be mistaken for that of Pau Amarello, which is farther to the south : over the fort is the church of Villa Velha, and in the interior is the elevated mount of Do-Grilo. Proceed to the northward with caution, and do not approach the coast until the channel is shut in by the fort, when mount Do-Grilo will be behind the village of Pilar ; then bring mount Ramalho in line with the watch tower at the south end of the fort and proceed as before.

In passing the bar, bring the fort to bear W. $\frac{3}{4}$ S., until the village of

Pilar bears N. $\frac{3}{4}$ W., taking care to avoid the small sand-bank on the south side of the bar. The channel then at first lies with the centre of mount Ramalho bearing W.S.W. and curves to the West; when Pau Armarello point is shut in, steer the latter course keeping on the south side of the channel, where anchorage will be found abreast the village in 3 or $3\frac{1}{2}$ fathoms water.

The CHANNEL or ARM of the SEA, which separates Itamaricá island from the mainland, is sufficiently large to be navigable for small vessels. In the northern part, having passed through the anchorage of Catuama, it is narrowed by two islets of mud which lie in the middle, and which leaves a space on either side of more than $1\frac{1}{2}$ cables in breadth. The greatest depth is on the side of the island where there are from $2\frac{3}{4}$ to $5\frac{1}{2}$ fathoms water. At the south end of the islets is the mouth of the rio Araripe, and in front of it is a hole or well $5\frac{1}{2}$ fathoms deep, mud bottom.

At about 3 miles southward of the mouth of the Araripe is that of the Rio do Congo or Tomba-as-Aguas, nearly $2\frac{3}{4}$ cables wide at low water, but it acquires a great breadth at high tides. From the mouth of the Congo for a distance of more than a mile the depths gradually decrease to about one fathom, and at high tides the channel widens considerably. Here the tides from the entrance of Catuama and the bar of the island meet, which no doubt is the cause of the accumulation of sand. At more than 3 miles southward of the Congo stands the church dedicated to St. Gonsalo and the village of Itapicuma, where there is a considerable trade in sugar.

The Dutch wanted to construct a bridge here to connect the island, which is distant about 968 yards, and the depth of water nearly 3 fathoms, over mud. The breadth of the channel at low water is only 430 yards. The village, extending about a mile north and south, stands on a low plain, with crawls on either side of it. The channel, having about the same depths, continues to the southward for $1\frac{1}{2}$ miles to a place named Marcos, known by a large tile house; here it forms an elbow and turns to the eastward and E.N.E. towards the bar of the island.

It is narrow, and at the south-west end of the island is a sand-bank with about 2 fathoms water over it, but there is 3 fathoms near the main. At $1\frac{1}{2}$ miles eastward of Marcos is the mouth of the rio Iguaraçu, and at $1\frac{3}{4}$ miles farther, on the north side of the channel, is the fort at the south-east end of the island. The deepest water is in mid-channel abreast the mouth of the rio Iguaraçu, then, by following along by Marcos and the course of the channel, a vessel may anchor off the village of Itapicuma.

The RIO JAGUARIBE.—This small river, at the north end of Itamaricá, is important from its great commerce in salt, procured from the

extensive salt works on the east side of the island and which commences at about one mile within the entrance. It is narrow, runs to the southward for about $3\frac{1}{2}$ miles, and carries from one to $3\frac{1}{2}$ fathoms water, with several holes or wells. The river is entered by the bar of Catuama, but its mouth on the north side is fronted by sand-banks which bound the south side of the channel to the anchorage of Catuama.

The **RIO ARARIPE** is the first river coming from the north which empties itself into the channel or arm of the sea separating Itamaracá island from the main. It is more than 6 miles in length, navigable for 3 miles, and about 260 yards in breadth at its mouth, with $3\frac{1}{2}$ to 3 fathoms water at 3 miles up, where the depths diminish to its extreme.

The **RIO CONGO**, southward of the Araripe, may be reached from the northward by the bar of Catuama, or from the southward by the bar of the island. It is navigable for small vessels for a distance of $1\frac{1}{2}$ miles, and at its mouth it is 218 yards in breadth, with 2 fathoms at low water, but at high tide it is much wider.

The **RIO IGUAÇU**.—The mouth of this river is narrow and lies on the main nearly opposite the ancient village of the island of Itamaracá. It is navigable for small vessels for a distance of 2 miles, carrying from one to 2 fathoms water; beyond which it is encumbered with shoals. At $1\frac{1}{2}$ miles from the sea is the town of the same name.

The **RIO MARIA FARINHA** or **JAGUARIBE** about $1\frac{1}{2}$ miles southward of the south-east end of Itamaracá runs to the south and south-west for a distance of 3 miles, carrying from $1\frac{1}{2}$ to 4 fathoms water; when it divides into two branches, the Jaguaribe continuing to the southward, and the Inhaman, the other branch, trending westward. The Maria Farinha, is about 195 yards in breadth at its mouth, and has a considerable trade in white chalk, which employs a large number of boats. The bar is obstructed by banks, leaving a channel with only $3\frac{1}{2}$ feet water.

At $1\frac{1}{2}$ miles S. by W. from the bar of the island is that of Maria Farinho, formed by a small opening in the recife with $1\frac{3}{4}$ fathoms water. The greater part of the recife between is uncovered, but it become covered when the mouth of the river bears W. $\frac{3}{4}$ S. The narrow channel, running about W. $\frac{1}{3}$ N. from the opening in the recife, and carrying from 9 to $3\frac{1}{2}$ feet to the entrance of the rio Farinho, is formed by sand-banks on either side. There is also a narrow passage between the recife and a ridge of rocks inside it and running parallel to it, having from one to $1\frac{1}{2}$ fathoms water over coarse gravel, which leads to the channel from the bar of the island.

The mouth of the river will be known by its south point of entrance being sandy, a little elevated, covered with cocoa-nut trees, and well

detached from the opposite shore, which is high and continues so to Ramalho point south of Itamaracá. At a little more than 2 miles southward of the bar of Maria Farinha is that of San José; the space between inside, the recife is filled with banks, some of which are uncovered.

The bar of San José will be known by three churches; that of Conceição near the shore; San José on the higher land; and the convent of São Bento on a hill of the same name more in the interior. The recife between is uncovered, and from the bar of the island to that of San José, it is fronted at the distance of a mile, by a rocky bank with $1\frac{1}{4}$ and $2\frac{1}{4}$ fathoms water over it, $3\frac{1}{4}$ fathoms inside it, and 6 and 7 fathoms at half a mile outside it.

The BAR of SAN JOSE.—The bay of San José is formed by the points of Maria Farinha and Leitao, the latter nearly half a mile S.S.E. of the church of Conceição. The recife, which passes at the distance of nearly $2\frac{3}{4}$ miles, has an opening about 38 yards in breadth with nearly 4 fathoms water, between the two Picões, which diminishes to about one fathom at three-quarters of a mile from the shore. The recife being low, and the winds from E.N.E. to E.S.E. causing a heavy sea, renders the anchorage here much exposed.

The bar lies with the church of Conceição bearing W. by S. $\frac{1}{2}$ S., and the fort at the south end of Itamaracá N.W. $\frac{3}{4}$ N. From the Picão on the south, a chain of rocks partly uncovered extends in a S.W. by W. direction towards the shore for a distance of nearly $1\frac{1}{4}$ miles. In running along the land at the distance of 4 miles for the bar of San José, the forts of Pau Amarello and Itamaracá, will be first seen, then the different churches. Care should be taken to pass the bar nearer the Picão of the north than that of the south. The anchorage will be known by the breakers; the water on the north side and near the shore shoals suddenly.

The COAST.—From Itamaracá to the southward the coast is composed of low cultivated woody hills with cocoa-nut trees and several villages. From fort Pau Amarello southward to Olinda the land increases in height. The shore presents a sandy beach, and from the north end of Itamaracá southward, it may be said no part of it is free from breakers, although interrupted in places.* At 2 or 3 miles from the recife there are from 10 to 14 fathoms water, sand and gravel.

At $4\frac{1}{2}$ miles southward of the fortress at the south-east end of Itamaricá is Leitao point, with a church about half a mile south of it; and at 3 miles beyond the point is that of Janga; with fort Pau Amarello a mile to the northward of it. At $1\frac{1}{2}$ miles south of Janga point is that of Quadra, forming a little bay, having midway the chapel of Conceição

* Captain Sir Thomas Pasley, H.M.S. *Curaçoa*, 1844.

do Medio. At $1\frac{1}{2}$ miles from Quadra point is the mouth of the rio Doce, with another chapel south of it, and at $3\frac{1}{4}$ miles farther on is Olinda point with the rio Tapado one mile north of it.

The recife, which is uncovered as far south as Quadra point, there becomes covered, more broken, and runs to the southward, having from 7 to 20 feet water on it. The bank continues to border the recife at about 2 miles from the coast, extending south-east of Olinda to a distance of nearly $2\frac{1}{2}$ miles with 3 to $5\frac{1}{2}$ fathoms water on it.

The space between the coast and the recife has from 8 to 23 feet water, on coarse sand; but as the recife has so much water on it, there is here a heavy sea caused by the swell from the offing. There are two or three patches of rocks nearly midway between the coast and the recife; they extend from a little northward of the mouth of the rio Doce to the southward for $1\frac{1}{4}$ miles with about 6 to 9 feet water on them.

Fort do Pau Amarello or Yellow-wood, is known by a break in the land, which looks like the entrance to a large harbour. Small coasters of 6 or 7 feet draught can enter at the bar at high water, and pass inside the reef and banks of Olinda to Pernambuco.

THE RIO DOCE.—The mouth of this river, which is encumbered with sandbanks, is a little more than 3 miles northward of Olinda, is about 100 yards by high tide and navigable for small coasters. The rio Tapado, about 5 miles southward of the disembarking after the heavy rains in the winter.

THE BAY OF PAU AMARELLO lies with the fort bearing W.S.W. at a distance from the shore. It is narrower and not so deep as that of San Paulo bay; the recife is here higher and the anchorage inside is more sheltered. Between the two points there is $1\frac{1}{2}$ fathoms water, sandy bottom. In the bay the water shoals and is encumbered with banks. Within the bay at the south, there is anchorage in 2 to 3 fathoms, coarse sand and gravel between a rocky bank having about one foot water on it, and the recife. The space in between there is not room to anchor, and it is necessary to make fast to the recife.

The fort of Pau Amarello with the convent of São Bento on the hill to the north west of it are good markers for the bay. At the distance of 4 miles from the bay being the line to bear W.S.W. and, deer for it; when it bears S.W. $\frac{1}{2}$ W. $\frac{1}{2}$ W. and then from Olinda point N. by W. $\frac{1}{2}$ W. a vessel will get out of the mouth of the bay, and having passed it may anchor inside the bay in 4 fathoms water, keeping Olinda point open; or more shelter will be found by the southward between Rapia bank and the recife. Vessels of 100 to 150 tons will find anchorage between the Rapia and the bank to the north of the channel to the southward.

OLINDA POINT.—The town of Olinda stands a little south of the point on the most elevated land in the vicinity of Pernambuco, and is remarkable from its white houses and churches, interspersed with trees. Between the two highest buildings there is a single cocoa-nut tree, which is very conspicuous; northward of Olinda the land is moderately high, nearly level, and covered with brushwood. The point is bordered by extensive reefs, with breakers, stretching seaward nearly 2 miles. The shore from thence curves to the westward and southward for about $2\frac{1}{2}$ miles to fort Bruno, at the entrance to Pernambuco.

Buoy.—A white buoy 8 feet above the sea, lies in 5 fathoms at low water, at about 2 miles E.S.E. of Olinda point, with Sê church tower W. by N. $\frac{3}{4}$ N.; the flag-staff of Buraco fort W. by S. $\frac{1}{2}$ S.; and the tower of the naval arsenal in Pernambuco S.W. by S. In clear weather it can be seen from a distance of 5 or 6 miles.

PERNAMBUCO, the capital and principal seaport in the province of the same name, is situated at the mouth of the river Capibaribe. It stands on a flat, and is divided into three parts, occupying respectively a peninsula, an island, and the continent. Recife or Pernambuco proper, is built on the peninsula formed by the rio Biberibe, which extends southward from Olinda, and is the most mercantile part of the city. Santo Antonio stands upon an island or sand-bank, formed by the arms of the Capibaribe, and connected with Recife by a long stone bridge. The third division of the city, called Boa Vista, is on the main land westward of Santo Antonio, and joined to it by a wooden bridge, considered the largest in Brazil.

A railway is in course of construction to the south-west, and partly in operation. The population of Pernambuco may be about 20,000. Its commerce is important, the exports consisting chiefly of cotton, sugar, rum, hides, and dye-woods; and the imports of cotton and linen cloths, hardware, cutlery, silks, wine, flour, salt fish, &c.*

In 1858, 680 vessels, of 170,894 tons, cleared inwards, of which 287 equal to 72,046 tons, were British; and in the same year 692 vessels, of 171,212 tons, cleared outwards, of which 294, equal to 72,867 tons, were British. The total value of the imports from Great Britain was 1,006,429*l.*, and the exports 406,677*l.*

The Recife, or reef in front of Pernambuco, which forms the harbour, runs in a straight line along the shore from the southward, commencing at Boa Viagem point, and terminates abreast fort Bruno on the peninsula, which commands the entrance to the harbour. Near the extremity of the reef is a small octagonal fort called Picão, and 50 yards northward

* Pernambuco is formed by the two words Parana bocca, which signifies mouth of the sea.

of it is the lighthouse, between which and fort Bruno is the entrance to the harbour, to which there are two passages.

The little bar, or that nearest the lighthouse, has 9 feet at low water, and 16 to 17 feet at high water springs, over which vessels drawing from 14 to 15 feet can pass. The great bar has 20 feet over it at high water springs, but is more exposed to the swell. In the outer anchorage vessels of any draught can load or unload with facility.*

Vessels in the harbour generally lie four in a tier, sheltered and moored parallel to the Recife. The water is nearly always smooth, except at high water springs, when the sea runs over the recife, causes a swell, and with strong sea breezes the vessels roll and strain considerably, but this lasts only for about two hours at each high water springs.†

PICAO CHANNEL.—Close to the northward of the lighthouse is the Tartanega rock, steep-to, between which and the first red buoy northward of it is the Picão or small channel. Steer in with the two south turrets of fort Bruno in line, and haul close round the rock and along the Recife until a cable's length from the lower tier of shipping, then drop the anchor and wait for orders from the harbour-master.

POÇO or WELL.—Immediately northward of the Recife, outside the harbour, is a basin called the Poço or Well, having a depth of 20 feet at low water, which shoals gradually to the shore. The entrance, which also leads to the harbour, formed by some detached sunken rocks, is between the two northernmost red buoys, and called the Great bar, having 20 feet over it at high water springs. Here vessels of more than 14 feet draught lighten to go inside, and take in the last part of their cargoes. Between the buoy marking the Picão channel and the southern entrance-buoy to the Well, the sea occasionally breaks.

ENGLISHMANS BANK, with 12 feet over it at low water, and on which the sea breaks heavily with a S.E. wind, lies N. by E. and S. by W. three-quarters of a mile in length and a quarter of a mile in breadth, with a buoy on each end. From the centre of the bank the lighthouse bears about W. $\frac{1}{2}$ S. nearly a mile distant. The marks for the shoalest part are the lighthouse and Boã Vista church in line, and the large cocoa-nut tree at Olinda in line with an old decayed church, the lowest public building in the town.

To clear the bank to the northward, keep the highest church in Boã Vista open to the northward of the lighthouse. To clear it to the south-

* Jose Faustino Posto, chief pilot, 1856. The great bar and harbour have since been deepened.

† See Admiralty Chart :—South America, East coast, Sheet 5, No. 529 with Plan of Pernambuco, scale $m = 1.15$ inches ; and Pernambuco to Maceió, No. 891, scale $m = 0.4$ of an inch.

ward keep the southern turrets of fort Bruno shut in or open south of the lighthouse. Between the bank and the basin or well is a passage nearly half a mile in breadth, with 5 fathoms water. The pilots state that this bank is increasing.

Buoys.—There are 5 large buoys off Pernambuco; one on the north end of Englishmans bank painted red and white in vertical stripes, and one on the south end, red, both bearing bells; and 3 red buoys in a line with the Recife, marking the channels into the harbour.

AFOGADOS BANK.—From abreast the village of Afogados, at about $1\frac{1}{4}$ miles southward of the lighthouse, a rocky bank trends to the southward at a distance of about one to $1\frac{1}{2}$ miles from the shore, having from 3 to $4\frac{1}{2}$ fathoms water on it. A supposed rocky shoal is marked in the old charts at $2\frac{3}{4}$ miles S. $\frac{1}{2}$ E. from the lighthouse, but no further information can be given, nor does it appear in the recent survey of this part of the coast by M. Oliveira, of the Brazilian navy.*

LIGHT.—On the reef 50 yards northward of fort Picão is a white octagonal tower, standing on a rock covered at quarter flood, which exhibits a *revolving* light, showing *twice* a white face and *once* a red face in succession every *minute*. The light should be seen in clear weather from a distance of 15 miles.

PILOTS.—Vessels visiting Pernambuco with the intention of going into the harbour will find it preferable to keep under way, standing off and on, or working to windward, according to the monsoon, to guard against the current. Pilots are generally in waiting to conduct vessels into the harbour, and are furnished by the Government. A harbour launch and crew are provided, if necessary, which must be paid for in addition to the pilotage. Application is made for the pilots at the arsenal.

ANCHORAGE.—Vessels may anchor anywhere southward of the buoy on Englishmans bank, giving it sufficient room, in 6 or 7 fathoms water, sand, shells, and patches of coral, at a mile or more from the lighthouse, but not with it to the northward of N.N.W., as within that bearing the bottom is rocky. The best holding-ground in the roads, and clear of old anchors, is about midway between the lighthouse and the south buoy on Englishmans bank, in 5 or 6 fathoms; this is also a good position for boats.† If intending to go into harbour be ready to get under way an hour and a half before high water.

* H.M.S. *Harrier*, when sounding and looking for this shoal, was several times deceived by numbers of fish, which, near the surface of the water, were taken for the shoal, and on two occasions put her helm down to avoid what appeared to be shoals with about 3 feet water on them, but which proved to be shoals of fish in $6\frac{1}{2}$ fathoms water.—R. W. W. Miller, Master, 1837.

† Commander Boys, H.M.S. *Express*, 1854.

This roadstead is by no means a desirable place for vessels to remain longer than necessary, particularly at the change of seasons, and the seaman should be prepared to weigh or slip, should it come on to blow. Commander James S. Thurburn, R.N., says, "during August, I scarcely know of one vessel lying in the roadstead that did not lose her anchor."

Vessels visiting this port for any time should go inside the recife, as the expense of pilotage will soon be liquidated in the saving of the wear and tear of boats, and in the straining of the vessel, rigging, &c. It is also much cooler inside the recife lying broadside to the sea breeze.

TIDES.—It is high water at Pernambuco, full and change, at 4h. 45m.; springs rise 8 and neaps 6 feet.

CAUTION.—The sea breaks heavily on Englishmans bank, with the wind from the south-east quarter, the same as on the Olinda and other reefs. Open boats should be careful, as accidents have occurred by boats getting too near the breakers.

DIRECTIONS.—During the north-east monsoon, vessels approaching Pernambuco from the northward should make the land northward of Olinda, and in passing the point give it a berth of 3 miles, keeping in not less than 10 fathoms water, for within that depth the soundings are irregular. The mark to clear Olinda reef, is a church with two steeples a little northward of the largest church in Santo Antonio, open southward of the lighthouse, and at night do not bring the light southward of W. by S.

During the southern monsoon vessels should make Cape St. Agostinho, and proceed along the coast to the northward at the distance of about 3 miles, when Olinda will be seen. In closing with the anchorage, Olinda should not be brought to the eastward of North until the lighthouse bears N.N.W., on this bearing there will be $7\frac{1}{2}$, 7, 6, and 5 fathoms water, to the anchorage. At night the light should not be brought to the westward of W. N. W., which bearing will lead about a quarter of a mile southward of the buoy on Englishmans bank. Allowance must always be made for the current, which sets strong, according to the monsoon.

THE COAST.—Pina point, at about $2\frac{1}{2}$ miles southward of Pernambuco lighthouse, is the extremity of a tongue of land projecting northward inside the recife, having some banks off it which uncover. The recife, uncovered and broken in places forming small bars, commences at Boa Viagem at $3\frac{1}{2}$ miles southward of the point, runs to the northward to the lighthouse parallel to the shore at a distance of about $1\frac{1}{4}$ cables with 3 to 6 feet water between. At a little more than 4 miles southward of Boa Viagem is Candeias point, the shore between forming a slight bay. At three-quarters of a mile northward of the latter point is

that of Venda Grande, and about the same distance farther north is a slight projection named Focinho da Boy.

From Candeias point the shore runs to the southward for 2 miles to the Barra das Jangadas, and from thence forming an indentation for about $6\frac{1}{2}$ miles farther to Cape St. Agostinho. At about 5 miles southward of Pernambuco lighthouse are some hills, on one of which, at about $1\frac{1}{2}$ miles inland, is the church of Nossa Senhora dos Prasêres, having two towers, and being the highest object, forms a good distant mark for this part of the coast. To the southward of it is the village and chapel of Boa Viagem, which, being on the point, is conspicuous; also the convent of Piedade, the village of Venda Grande, and the village and church of Nossa Senhora da Candeias, and at $3\frac{1}{2}$ miles northward of Cape St. Agostinho the village and church of São Gonzalo da Paiva.

At $1\frac{1}{4}$ miles southward of Venda Grande point and nearly abreast the convent of Piedade, which is close to the shore, isolated, and about three quarters of a mile northward of Focinho da Boy, is the north end of a narrow chain of rocks with about $2\frac{1}{2}$ feet water on them; they extend to the southward for more than a mile at about half a mile from the shore. From Venda Grande point the recife runs to the southward, fronting the village of Cardeias, and again terminates a little southward of Simão Pinto point north of the Barra das Jangados. The rocky bank extending to the southward from abreast the village of Afogados terminates about a mile southward of the bar of Jangadas.

THE BAR OF CANDEIAS, at $9\frac{1}{2}$ miles southward of Pernambuco lighthouse, is formed by a break in the recife fronting the village of the same name, and which terminates near Simão Pinto point south of it. It is 125 yards in breadth N.E. $\frac{1}{3}$ N. from the church, and has 17 feet water, mud, in the middle of the bar. Two rocky patches extending from the recife to the shore forms the anchorage into the figure of a trapezium, but it is small and inconvenient. On the rocky bank which fronts this part of the coast at $1\frac{1}{4}$ miles from the shore, there are 4 fathoms water.

THE BAR OF JANGADAS, at rather more than three-quarters of a mile southward of Simão Pinto point and 6 miles northward of Cape St. Agostinho, communicates with the two rivers Pirapáma and Jaboatão. It is about 42 yards in breadth, with from 3 to 6 feet water on it; but as it is exposed to all winds there is here a heavy sea, and the sands shift. In winter coasting vessels of light draught can cross the bar only under favourable circumstances. Inside the bar there is a space of more than a third of a mile, with 2 and 3 fathoms water between sand-banks.

In the interior north-west of the bar of Jangadas there are three hills:

the middle one is round and named Canguito, that on the south Moguahipe, and that on the north Sapé.

The rio Jaboatão falls into the sea at the bar of Jangadas. Its mouth is about 300 yards in breadth with 2 to $2\frac{1}{2}$ fathoms water. It runs to the north-west and its muddy banks narrow gradually. From its right bank close to the church of St. Antonine near the sea a narrow long bordigue leads to the pool of Curcuranas at 3 miles to the north.

The rio Pirapáma here also falls into the sea from the south-west. Its mouth is 140 yards in breadth, with more than 2 fathoms water; its stream runs with some strength and forms a waterfall at a little distance from its mouth.

GAIBU BAY.—At a little more than 2 miles north-west of Cape St. Agostinho is Pedras Pretas point, the space between is called Gaibú bay, where there are from 2 to 3 fathoms water over mud and sand. The head of the bay is skirted by a chain of rocks close to the shore. Pedras Pretas point is also surrounded by rocks, and two isolated banks lie off it; the outer, with 14 feet on it at a mile from the point, bears from Cape St. Agostinho N. by E. $\frac{1}{2}$ E.; the other shoal is between the outer one and the point. In the bay at the foot of the cape is the little village of Gaibú, which will be known by the cliffs behind it, and about a mile from the cape is fort St. François Xavier de Gaibú, and in front of it the anchorage.

The bay affords shelter for small vessels from south-easterly winds, but the anchorage is limited and exposed to northerly winds, when the communication with the shore is difficult. To the north-west of Pedras Pretas point is a hill on which is the church of São Gonzalo da Paiva; and at 5 miles northward of the point is that of Simão Pinto, forming between Paiva bay. The Recife re-appears at $1\frac{1}{4}$ miles north of Pedras Pretas point, and skirts the shore at about a cable's length for $1\frac{1}{4}$ miles to the northward.

CAPE ST. AGOSTINHO.—At $17\frac{1}{2}$ miles southward of Pernambuco lighthouse, is a rugged projecting promontory of moderate height. The cape is known by its red cliffs with a church and several cocoa-nut trees on its summit. Its base is formed by several points in detached large rocks, near which there are 5 and 6 fathoms water. In clear weather it can be seen at a distance of about 24 miles. At the point of the cape is a rill of warm fresh water, named the rill of the Ladies; and the inhabitants of the village of Nazareth, on the highest hill of the cape, state it never fails.

At about 3 miles northward of the cape are some rugged white cliffs, appearing, when at a distance, like clothes hanging to dry. The shore from the cape northward is low and covered with trees, nearly as far as

Pernambuco. On the south side of the cape, which projects in the direction of the end of the recife, is fort Nazareth, and outside it a beach of sand named *Salvação*. At from 2 to 4 miles off shore there are from 11 to 15 fathoms water, sand and broken pearl shells.

The COAST.—From Cape St. Agostinho the coast to the southward for 14 miles to Serramby point is low, level, and covered with brushwood. At rather more than 6 miles southward of the cape is Cupe point, a little salient, with a village on it, and cocoa-nut trees on either side of it. The point is surrounded by the recife. At 3 miles southward of Cupe point is Port de Galinhas; at about the same distance farther south is Maracahype point, and at $1\frac{1}{2}$ miles S.S.W. $\frac{1}{3}$ W. of the latter is that of Serramby.

Between Cupe and Serramby points the coast is very low, and when skirting it, it appears at intervals marshy and drowned. From the offing to the northward and southward are seen places remarkable by large quantities of cocoa-nut trees, the church of N. S. dos Oiteiros, on a hill between Cupe and Maracahype points, and, in approaching the small villages of Cupe and Porto Galinhas, another church near the sea at the mouth of the Maracahype. The shore is a white sandy beach.

The recife, which commences close to the coast forming the south part of Cape St. Agostinho, is uncovered, and runs along shore, at a distance of about three-quarters to 2 cables, to $1\frac{1}{4}$ miles southward of Cambôa point at the rio Ipojúca, where it joins the coast. It re-appears close in front of Cupe point, and extends along by Porto de Galinhas, and by Maracahype and Serramby points, terminating about three-quarters of a mile southward of the latter, and about one mile northward of San Aleixo island. This latter part is broken in places for distances of about a half to three-quarters of a mile, and north-east of Maracahype point it is nearly $1\frac{1}{2}$ miles from the shore.

From about 2 miles north of Cupe point, to the southward the shore should be approached with caution, and not into less than 7 fathoms water.

The RIO SUAPE falls into the sea at about $1\frac{1}{2}$ miles south-west of Cape St Agostinho; it is 645 yards in breadth at its mouth with 11 to 17 feet water over fine sand; at 2 miles up it is 215 yards in breadth with 3 to 5 feet water, when it suddenly narrows. The bar of Suápe, which leads also to the rivers Tatuóca, Ipojucã, and Merepe, is formed by a break in the recife near Cape St Agostinho. It is narrow, the ebb tide is very strong, and when the wind is from seaward there is a heavy sea.

It is difficult and dangerous to pass; and frequented only by small vessels which enter at high water, and leave a little before that time. During winter with South and S.E. winds, vessels are sometimes detained for more than a month for a favourable moment to leave.

The **RIO TATUOCA** falls into the sea southward of the Suápe, having with it a common entrance about half a mile in breadth, bordered on either side by sand banks. The Tatuóca is 130 yards in breadth at its mouth, but it widens within to between 220 and 435 yards with depths of from 10 to 14 feet. At 3 miles up it divides into two little rivulets; the Braza, running to the west, and the Taveira to the north-north-west.

The **RIO IPOJUCA** runs into the sea, through sand-banks which dry in places at 3 miles southward of the cape, in the little bay formed by Cambôa point on the south. It has from 5 to 7 feet water at its mouth, which increases to 3 fathoms within and deepens again for more than 3 miles up. It leads to the village of Ipojúca at about $5\frac{1}{2}$ miles from its entrance.

The **RIO MEREPE** runs into the sea from the southward close to the mouth of the Ipojúca at $1\frac{3}{4}$ cables within Cambôa point. Its mouth is 216 yards in breadth, but the river widens for about three-quarters of a mile when it narrows. Its mouth is encumbered by coral, which is also found in the river, where there is a depth of from 7 to 10 feet along the eastern bank. At $2\frac{1}{4}$ miles up is the port of Jaiqui, which is three-quarters of a mile from the village. It is frequented by vessels of light draught for wood.

PORTO de GALINHAS.—The entrance to this port is formed between the picão or extremity of the recife bordering this part of the coast on the south, and which terminates with Galinhas point north of the village, bearing S.W. by W.; and by an isolated rocky bank about $1\frac{1}{2}$ cables to the north, with the same point bearing from its south extreme S.W. In the middle of the entrance there are $3\frac{1}{2}$ fathoms water, and farther in $2\frac{3}{4}$ and $2\frac{1}{2}$ fathoms, mud bottom, but near the shore coarse sand. A chain of rocks extend from the picão of the south towards the point, which become scattered, and encumber the port. The anchorage is exposed, being open to the bar; small vessels whose draught will admit may anchor in front of the town by passing above the rocks at the proper time of tide.

Vessels approaching the bar of Galinhas, when at a distance of 3 miles from the coast, should keep the two round mountains, which are behind the village of Galinhas and distinctly seen, open northward of the coconut trees north of the village on Galinhas point, and steer in with the point bearing S. W. $\frac{1}{2}$ W. for the bar at about three-quarters of a mile northward of the point. With the wind from north to east a vessel can enter the port round the north end of the rocky bank, between it and Cupe; but with southerly winds the passage first named should be taken.

The **RIO MARACAHYPE**, runs into the sea from the northward, between the point of the same name and that of Serramby ; its mouth is about 50 yards in breadth, but it widens within for about 3 miles, and then narrows rapidly ; it has 10 feet water at its mouth, and 7 to 14 feet in the river.

The **RIO SERINHAEM** falls into the sea from the north-west, southward of Serramby point and westward of San Aleixo island. Its mouth is about 210 yards in breadth, but it is obstructed by sand-banks, leaving a channel navigable for small vessels, which load with wood about 6 miles above the town of Serinhaem and which is 6 miles in the interior. The Trapixe or Grande Bordigue desembogues from the westward, having a common entrance with the Serinhaem. It is about 3 miles in length, carries from about 6 to 9 feet water, and is navigable as far as the mill of the same name.

The recife from Serramby point to about $1\frac{1}{2}$ miles south-west of San Aleixo, skirts the coast, at the distance of half a mile, and covers the mouth of the river ; the northern part of it is very broad ; it is bordered by a bank with some isolated rocks, near which there are $5\frac{1}{2}$ fathoms water ; inside the recife there are a number of dry sand banks and isolated rocks.

This part of the coast is known by San Aleixo island situated off the mouth of the river, and by the Sellada mountain at about 16 miles north-west of the island. Near the mouth of the rio Formoso on the south is a hill, on the summit of which is the church of N. S. de Guadalupe, and more to the north in the interior, on the summit of another hill, is the town of Serinhaem and convent of San Francisco. Further the little villages of Barra de Serinhaem, Gamella, and Barra de rio Formoso are seen from a certain distance, at the mouths of the rivers.

SERRA SELLADA, or Saddle hill, about 12 or 13 miles inland, and about midway between Cape St. Agostinho and Meracahipe point, is a ridge of high land extending north and south, with a break in the middle dividing it into two round hummocks. This is the highest land in the neighbourhood, and is in about lat. $8^{\circ} 26'$ S., long. $35^{\circ} 11'$ W.

SAN ALEIXO ISLAND.—At about $3\frac{1}{2}$ miles S.S.W. of Meracahipe point is the little island of San Aleixo, about two cables in extent, and 70 feet high at its south-west end. There are two houses, a well of fresh water, and a few sheep and poultry are reared on it. From the north-west part of the island a reef extends westward for 2 cables ; at the distance of $2\frac{1}{2}$ cables from the south end, and connected by a reef, is the Turtle rock, which always shows ; the reef continues about a cable to the southward of the rock. At the distance of three-quarters of a mile

eastward of the island there are 10 fathoms water, clay bottom ; at a quarter of a mile, 7 fathoms. About a mile to the southward of it, the soundings are irregular, shoaling rapidly from 12 to 4 fathoms.*

About three-quarters of a mile inside the island, is a passage through the Recife for country boats, to the mouth of the Serinhaem, but the sea breaks across it.

ANCHORAGE will be found inside the island in 4 and 5 fathoms water, sand and fine gravel. In going in southward of the island, steer with the tallest cocoa-nut tree in the village bearing N.N.W. $\frac{3}{4}$ W.; but as the dark background makes it sometimes difficult to distinguish, give the Turtle rock, which is always seen, a berth, keep the lead going, and when in 6 or 7 fathoms, haul to the northward and anchor where convenient. Captain Buckle of H.M.S. *Growler*, 1843, says, that he visited this anchorage three times in September and October and found it safe and well sheltered.†

TIDES.—It is high water at San Aleixo island, full and change, at about 4 h. 20 m. ; and the rise of tide is from 10 to 12 feet.

The **RIO FORMOSO** falls into the sea at 5 miles S.W. $\frac{1}{2}$ S. from San Aleixo island and 4 miles northward of the fort of Tamandaré ; it is 456 yards across at its mouth, but widens a little within for about a mile, when it narrows, and after passing the town there is hardly room for a boat. Within the entrance on the south side is a sand-bank leaving between it and the north shore a passage into the river carrying 8 feet water, which increases farther on to 17 feet.

The town of the same name stands on the right bank at $4\frac{1}{2}$ miles from the entrance. The rivulet Passo runs into the Formoso from the northward at $1\frac{1}{2}$ miles within its mouth, and the Ariquinda from the southward at one mile. A remarkable building stands on the point to the north, and there are two white cliffs to the southward.

The **BAR of GANELLA** and the principal entrance to the rio Formoso is $1\frac{1}{2}$ miles northward of the mouth of the river, and from 85 to 110 yards in breadth with 2 fathoms water, on muddy bottom. It is formed by a break in the Recife which stretches close along shore, covering the mouth of the river from the south point of entrance to the northward of the village of Gamélla. Within the two picãos the water diminishes to 5 and 3 feet. The Recife north of the bar is covered, but after a short interval it appears above water, while that to southward is also partly uncovered. Outside the bar the water deepens to 5 and 6 fathoms over mud and fine sand, where vessels of more than 5 feet draught should anchor.

* Commander Haggard, H.M.S. *Virago*, 1856.

† See Plan:—San Aleixo island, No. 1,647, scale, $m = 5$ inches.

At Gamélla point on a hill in front of the village are some black rocks which are conspicuous from the offing in contrast with the white sand.

Manguinho, the south point of the entrance to the rio Formoso, is a little more than 3 miles to the northward of Tamandaré; the coast between is low and void of trees. The shore immediately south of it makes a slight bend and forms the bay of Campas. The recife, which is uncovered at the little bar of Bobo, northward of Tamandaré, becomes covered from distance to distance and broken into large detached rocks until the mouth of the Formoso bears W.N.W. $\frac{3}{4}$ W., when it rises rapidly and shows three heads, named Juia or Criminoso, to the north of which it is again covered, terminating with the village of Gamella bearing about W. $\frac{3}{4}$ S. distant 2 miles.

It is skirted all along by sunken rocks. The interval which separates the recife from the shore is also full of rocks, being a continuation of those in the north part of Tamandaré bay. This part of the coast is but little sheltered, and completely deserted. As the recife is often covered, the sea beats on the shingle shore with violence.

DIRECTIONS.—The bar of Gamélla is easily known by the village and cocoa-nut trees on the point. In coming from the northward having passed San Aleixo island, steer in the direction of Gamélla point, taking care to avoid the reef extending southward across the mouth of the Serinhaem. When the church of N.S. de Guadalupe (on the hill of the same name) is on with the cocoa-nut trees on Gamélla point, then steer about S.W. $\frac{1}{4}$ W. for the bar, leaving the north end of the exterior reef, which is more than 2 miles from the shore to the southward.

In coming from the southward steer with San Aleixo island bearing about N. $\frac{1}{2}$ W. until the above church is on with the cocoa-nut trees, then proceed as before. The anchorage inside the bar is very limited, fit only for the smallest coasters, and is in front of the village on muddy bottom.

TAMANDARÉ.—The port of Tamandaré, sufficiently large for several vessels, is formed by a bay fronted by the recife. The entrance is through a break in the latter about 4 cables in breadth, but which is contracted by two reefs named the Baixa Grande, and the Baixinda. On the north Picão there are 14 feet water, with the fort bearing N.N.W. $\frac{3}{4}$ W., and Ilhetas point W.S.W. $\frac{3}{4}$ W. On the south Picão there are 10 feet water with the fort bearing N.W. by N., and the same point W.S.W.

In the middle of the entrance there are 7 fathoms water, mud bottom. The Baixa Grande lies with the fort N.W. $\frac{3}{4}$ N., and Tamandaré N. by W. with 13 feet on it, and 4 to 6 fathoms around it. The Baixinda is only about 20 yards in extent east and west with 10 feet on it, and lies with the fort N.W. by N. and Tamandaré point North.

The anchorage has from $3\frac{1}{2}$ to 4 fathoms water close to the shore, and is protected by the recife here named Ilha da Barra, but a vessel should not go too far to the north on account of a chain of rocks which extend from Ilha da Barra to Tamandaré point. There is, however, in the south part of the port, a large space with good anchorage and sheltered by the recife, but as the exterior recife is low and covered at half tide, it is exposed to all winds. Although the Baixa Grande is nearer the north picão than that of the south, the passage between has 5 and 6 fathoms water, on sand and gravel.

In the bay, at rather less than a mile to the northward of Ilhetas point, is the entrance to the two little rivers Brejo and Ilhetas, but it is completely obstructed, and at low tides fronted by a large bank. The village of Tamandaré stands on the sandy shore south of the point of the same name, and southward of it is a square fort. The port is capable of being improved, and from the fertile surrounding plains it may in the future acquire importance. It is the only place capable of affording any shelter from Pernambuco to Bahia.

Water can be procured from a well at the back of the fort. The casks have to be rolled some distance over soft sand, and not more than 15 tons can be obtained in a day. There is no trade here, it being merely a stopping place for coasters.*

DIRECTIONS.—The entrance to Tamandaré will be known by the village and the square fort south of it, and some red clifty land in the interior on the north, and on the south by an oblong hill named mount Brito with some cocoa-nut trees on the summit and an isolated house, and the same on the north extremity of the hill. Having seen the fort, steer for it until at 3 miles from the shore, when the red cliff will be seen.

Bring the cliff in line with the cocoa-nut trees on the north extremity of mount Brito, and steer to the N.W. for the bar passing between Baixa Grande and the south picão, and continuing the same route towards the fort until Ilha da Barra is passed; then steer to the north and anchor where convenient. To the S.E. of the fort there is also anchorage, but as the entrance is wide it is exposed to the sea, which renders it uneasy.

The COAST from Ilhetas or Mamucabinha point trends S.W. by S. for 6 miles to Gravatá point, forming between an indentation, in the southern part of which the river Una runs into the sea, and at 3 miles beyond the latter point is that of San José; the shore between is low, with the exception of a large and elevated rock named Pedra do Condé, which is isolated and remarkable, and here the hills come close to the shore. At about $1\frac{1}{2}$

* Commander Boys, H.M.S. *Express*, 1859.

miles northward of the Pedra do Condé is a cluster of small rocks close to the shore named Pedra do Porto.

The village of Abreu de Una, on the west bank of the river, is remarkable from the offing. The recife, which is covered from place to place, passes at less than a mile from Ilhetas point, and about $1\frac{1}{2}$ miles from the middle of the bay, where, south-west of the Pedra do Condé, it leaves a large open space named the pass of Una. The village of San José, with its hermitage on the point of the same name, is also remarkable. From this latter point to that of Antunes, at 8 miles farther on, the coast is uniform, but northward of Mangues point the land rises a little. The recife rises again with Gavatá point, south of the Una, bearing W.S.W., $1\frac{1}{4}$ miles from the shore, and runs to southward broken in places as far as the Barra Grande. It is all along at the distance of about half a mile bordered by a rocky bank.

THE PASS OF UNA is formed by an open space in the recife of about $1\frac{1}{2}$ miles in breadth, and leads to an anchorage on the north having from 2 to $3\frac{1}{2}$ fathoms water. The north end of the southern part of the recife lies with Gravatá point bearing W.S.W., and the south end of the northern part with Gravatá point S.W. $\frac{3}{4}$ W., and Pedra do Condé N.W. $\frac{1}{4}$ W. From Gravatá point an inner reef in detached rocks extends northward across the mouth of the Una for nearly 2 miles, or until the chapel of Varzeu bears W.N.W.; the reef is broken in two parts, leaving a passage for small vessels to the Una. There is also anchorage in the same depth as above, on muddy bottom, inside the northern portion of the reef, named Caixaó, but it should be approached with a fair wind, and a vessel should not go too far in, as there are sand-banks, and the current from the Una is very strong.

The land northward of the Una is uniform, but it has a break at the village of Vaú, which is seen when abreast it. At the same time a small cliff is seen, which should be brought in line with the Pedra do Condé, then steer N.W. for the anchorage, passing the picão of the north, which always shows, at a prudent distance. In coming from the southward the constant line of breakers will be seen, and a vessel should be guided by the Pedra do Condé as before, but it should not be mistaken for that of Pedra do Porto at about $1\frac{1}{4}$ miles northward of it.

THE RIO UNA disembogues at 6 miles southward of Tamandaré fort; it is about 16 yards wide at its mouth with 7 feet water, and is obstructed by a bank having only 4 feet on it, and on which the sea breaks in fresh breezes. Within, the river forms a pool on the south, where is situated the village of Abreu de Una, and trends to the north-west, leading to the villages of Varzeu and Vaú Una, also to the town of Barreiros, where a

great quantity of sugar is shipped. The current of the Una is very rapid and small vessels which frequent it are only able to descend when the water is high. In the summer the stream is less strong than in the winter, when it is dangerous and often carries vessels on the rocks in front of it.

The **RIO CRUZ** empties itself into the sea about half a mile southward of Gravatá point south of the Una; it is about 50 yards wide at its mouth with 4 to 6 feet water, and leads to Campina Grande, a distance of 39 miles.

The **RIO PERSINUNGA**, about 12 miles in length, separates the provinces of Pernambuco and Maceió. Its mouth is about 20 yards wide with little more than a foot of water, and consequently not navigable: on its south point are three or four huts.

BARRA GRANDE.—This part of the coast is easily known by the different white cliffs north-east of the church or convent of São Bento (which is by the side of a large house on the summit of a hill of the same name) and which extends northward to the church of Barra Grande, standing on a little rising land near the shore, as well as by the village of Gamella, southward of Barra Grande, situated between the hills.

The port of Barra Grande is in a bay about $2\frac{1}{4}$ miles deep, formed by São Bento point on the south, and by that of Antunes or Barra Grande on the north, a distance of more than 7 miles; but the part known as the port of Barra Grande covers only a space of about 3 miles in length and $1\frac{3}{4}$ miles in breadth. The bay is fronted by the recife, which runs along the coast from the northward, passing $1\frac{1}{2}$ miles from Antunes point, and from thence southward, trending about S.W. by S., forming several breaks or openings, and continuing generally covered in large detached rocks, named Alagados de Japarutuba.

The first and most important of these openings is the Barra Grande, which lies east of Gamella; at $6\frac{1}{2}$ cables to the north is a second opening named Barreta de Canindé, and at the same distance on the south is a third opening named Alagados. The entrance to Barra Grande, about three-quarters of a cable wide, lies with the church of the same name bearing N.W., and that of São Bento W. by N. $\frac{1}{2}$ N. Between the two picões there are $3\frac{3}{4}$ fathoms water, and from 2 to $3\frac{3}{4}$ fathoms inside the recife. On approaching the bar bring a conical green hill midway between two cliffs and steer to the N.W.

When inside the bar a vessel may anchor off the town of Barra Grande; but not too far to the northward, in order to avoid the sand-bank which stretches from the shore to the recife; or southward of the town of Gamella. From the latter town an inner reef leaves the shore, curves along it at the distance of a mile to as far south as Porto de Pedras, where

it again unites with the shore ; it is broken in places into detached rocks, and has from one to 2 fathoms inside it.

THE RIO SALGADO runs into the sea, a little southward of the church of São Bento. It is 18 miles in length, 25 yards in breadth at its mouth, with about 4 feet water. To the northward of it are the small rivers Maragogy and Páus, which are 6 and 12 miles in length, but of no importance.

SERRAS of MARAMBAYA.—Northward of Maceio, and about 25 miles inland, are the Serras of Marambaya, a conspicuous chain of mountains, seen at the distance of 45 miles. The surrounding land has no diversity of appearance.

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The **RIO PERSINUNGA**, about 12 miles in length, separates the provinces of Pernambuco and Maceió. Its mouth is about 20 yards wide with little more than a foot of water, and consequently not navigable: on its south point are three or four huts.

BARRA GRANDE.—This part of the coast is easily known by the different white cliffs north-east of the church or convent of São Bento (which is by the side of a large house on the summit of a hill of the same name) and which extends northward to the church of Barra Grande, standing on a little rising land near the shore, as well as by the village of Gamella, southward of Barra Grande, situated between the hills.

The port of Barra Grande is in a bay about $2\frac{1}{4}$ miles deep, formed by São Bento point on the south, and by that of Antunes or Barra Grande on the north, a distance of more than 7 miles; but the part known as the port of Barra Grande covers only a space of about 3 miles in length and $1\frac{3}{4}$ miles in breadth. The bay is fronted by the recife, which runs along the coast from the northward, passing $1\frac{1}{2}$ miles from Antunes point, and from thence southward, trending about S.W. by S., forming several breaks or openings, and continuing generally covered in large detached rocks, named Alagados de Japarutuba.

The first and most important of these openings is the Barra Grande, which lies east of Gamella; at $6\frac{1}{2}$ cables to the north is a second opening named Barreta de Canindé, and at the same distance on the south is a third opening named Alagados. The entrance to Barra Grande, about three-quarters of a cable wide, lies with the church of the same name bearing N.W., and that of São Bento W. by N. $\frac{1}{2}$ N. Between the two picões there are $3\frac{3}{4}$ fathoms water, and from 2 to $3\frac{3}{4}$ fathoms inside the recife. On approaching the bar bring a conical green hill midway between two cliffs and steer to the N.W.

When inside the bar a vessel may anchor off the town of Barra Grande; but not too far to the northward, in order to avoid the sand-bank which stretches from the shore to the recife; or southward of the town of Gamella. From the latter town an inner reef leaves the shore, curves along it at the distance of a mile to as far south as Porto de Pedras, where

it again unites with the shore ; it is broken in places into detached rocks, and has from one to 2 fathoms inside it.

THE RIO SALGADO runs into the sea, a little southward of the church of São Bento. It is 18 miles in length, 25 yards in breadth at its mouth, with about 4 feet water. To the northward of it are the small rivers Maragogy and Páus, which are 6 and 12 miles in length, but of no importance.

SERRAS of MARAMBAYA.—Northward of Maceio, and about 25 miles inland, are the Serras of Marambaya, a conspicuous chain of mountains, seen at the distance of 45 miles. The surrounding land has no diversity of appearance.

PORTO de PEDRAS, at about $8\frac{1}{2}$ miles southward of Barra Grande, is protected by the recife, having during southerly winds smooth water inside it with 3 and 4 fathoms water, sandy bottom. The port is capable of admitting five or six vessels of about 120 tons. Strangers should approach cautiously with the lead. At about three-quarters of a mile northward of the north end of the recife, which shelters the anchorage, is the **Baixa Grande**, and nearly the same distance north and north-west of it, two other shoals with from $4\frac{1}{2}$ to 6 fathoms between them. The rio Porto Calvo disembogues southward of the anchorage, and the town on the shore south of the entrance carries on a small trade.

THE COAST.—From Porto de Pedras to the rio Camaragibe, 14 miles to the south-west, the land is level, with low brushwood and cocoa-nut trees here and there, having a white sandy beach bordered by the recife, which is about a mile from the shore. On the south side of the Camaragibe is a range of bare cliffs of red sand. Near the river Sto. Antonio-mirim, or little Sto. Antonio, at 17 miles farther south, is also a range of red cliffs $1\frac{1}{2}$ miles in extent, and three small round hills which stand on its northern side ; between the two rivers is that of Sto. Antonio Grande, several small streams, and one or two little villages.

The shore also along this latter part of the coast is bordered by the recife, which is broken and uncovered from distance to distance with an outer line of reefs running parallel to it at one to $1\frac{1}{2}$ miles from the coast, terminating a little south-west of the Sto. Antonio-mirim. From thence the coast continues to the south-west for 7 miles more to Verdé point. Between, several small streams run into the sea, and the rocks here and there extend off about three-quarters of a mile. There is anchorage with northerly winds, protected by the shoals and reefs southward of the entrance to the rio Camaragibe, in from $2\frac{1}{2}$ to 4 fathoms water, muddy bottom.

VERDE POINT.—The north-eastern point of Maceio bay has many cocoa-nut trees on it, is low, salient, and surrounded by rocks and heavy breakers. The coast northward of it is generally sandy with small portions of reddish cliffs, and frequently covered with cocoa nut trees.

MACEIO is the only convenient anchorage between Pernambuco and Bahia, in a bay formed by the land trending westward from Verde point, and protected from all northerly winds and as far south as E.S.E. by the reef, which terminates suddenly at 2 miles south-westward of Verde point, and which is covered at high water. The shore of the bay is a white sandy beach, along which, interspersed with cocoa-nut trees, is the village of Jurugua, and about half a mile eastward, in an outer bay, is the village of Pajucara, with a sandy point between, on which is a small fort.

At nearly $1\frac{1}{2}$ miles S.S.W. from this fort, or about 4 cables from the southern extremity of the reef, is a detached shoal, with 15 feet water over it, which breaks with strong southerly winds. In the summer months, this bay may be considered safe, but from May to September, when the southerly winds prevail, it is much exposed, and a heavy swell sets in. With southerly winds, the landing is bad at low water, the steps at the trapiche, or covered wharf, being the only place to land, where a *red* light is kept burning during the night, which may be seen at a distance of 4 or 5 miles.*

Close to the westward of Jurugua is a little rivulet, with another small fort; and on the hill above, on the western side of a woody bluff, is the town of Maceió, and the capital of the province of Alagoas, with a population of about 5,500. The principal exports are cotton, sugar, and rum. In 1857, 42 vessels, of 17,645 tons, entered the ports of the province, and 39 vessels, of 16,627 tons, cleared outwards.

Buoys.—A white buoy is placed at each end of the recife; and one on the shoal southward of the eastern fort and reef.

Supplies.—All kinds of supplies are to be had, but are very dear. Water can be obtained by digging wells, or in the bay of Pajucara at a well near the beach.

LIGHT.—On the western point of the hill which overhangs the town of Maceió is a lighthouse, which exhibits, at the height of 208 feet above the level of the sea, a light of the third order, which should be seen in clear weather from a distance of 22 miles. The light is intermittent, with

* See Plan:—Port Maceió, with views, No. 539, scale, $m = 4$ inches; Plan on Admiralty Chart, South America, East Coast, Sheet 5, No. 529, scale, $m = 1\frac{1}{2}$ inches; and Chart, Maceió to Rio de Francisco, No. 892, scale, $m = 0\cdot4$ of an inch.

a *flash* every *two minutes*. It shows a steady white light for *seventy seconds*, it is then eclipsed for *sixteen seconds*, then a white light for *twelve seconds*, another eclipse for *twenty-two seconds*, then again the steady light ; thus completing its phases in an interval of two minutes.

PILOTS.—There is a regular harbour-master at the village of Jurugua, who will come off to vessels on the usual signals for a pilot being made ; but the men who fish in the *jangadas*, or sailing rafts, which are constantly met with on this coast, are good pilots.

TIDES.—It is high water in the bay of Maceió, full and change, at 4h. 30m. ; springs rise $8\frac{1}{2}$ feet.

DIRECTIONS.—During the southern monsoon vessels should approach the bay from the southward. The land may be known by mount Barriga standing alone in the interior ; by a reddish spot on the face of the cliff about 5 miles south-west of Maceió ; and by a white chapel with two towers in the same direction. The president's palace, a large square white building, the house of assembly, new church, and lighthouse at Maceió can also be seen from a long distance. There is nothing on the coast to indicate the position of Maceió to vessels coming from the northward, but in closing with the bay, Verde point being salient and surrounded by breakers cannot be mistaken, to which give a berth, and in rounding the reefs Maceió will be seen.

A remarkable red patch on the western side of the bay bearing W. by N. will lead between the detached shoal and the reefs in 8 to 6 fathoms water ; the reef is easily seen, and steep-to. A vessel may pass on either side of the white buoy on the 15-foot shoal, but not too close ; then haul up for the anchorage, leaving the buoy on the end of the reef on the starboard hand, and anchor where convenient to the north-west of it in about $4\frac{1}{2}$ fathoms, sand and clay. In coming from the southward keep the light to the westward of North until nearly up to the anchorage, then steer in according to discretion, assisted by the buoys.

LAGOA do NORTE is about $3\frac{1}{2}$ miles in length in a north-west direction and $2\frac{1}{2}$ miles in breadth, having from 6 to 9 feet water, mud bottom. The rio Mundahú runs into its inner or north-west part. Many houses are scattered along its north-east, and two villages with their chapels on its south-west bank. Its narrow entrance is $2\frac{1}{2}$ miles south-west of Maceió lighthouse, and the passage in is between low islets and shoals for $2\frac{1}{4}$ miles.

LAGOA MANGUABA, at about 4 miles south-west of the Lagoa do Norte and parallel to it, runs into the interior for nearly $19\frac{1}{2}$ miles ; at $3\frac{1}{2}$ miles from the sea it gradually widens to 3 miles at its head, with from 4 to 14 feet water, mud bottom. Two or three small streams empty them-

selves into it, and two or three villages stand on its banks. Its entrance is in common with that of the Lagoa do Norte, and runs to south-westward inside a narrow tongue of land for 3 miles, when it trends to the westward a little northward of Porto Francez.

From the south-west part of the Lagoa do Norte a narrow stream winds to the south-west into that leading to the Lagoa Manguaba and forming with it Ilha de Sta Rita. The town of Alagõas stands at the south end of the Lagoa at $3\frac{1}{2}$ miles from the coast. The produce of the interior is brought to the coast through the lagoas by means of jangadas.

The COAST.—At $8\frac{1}{2}$ miles south-west of Verde point is port Francez, which is small and can be used only by vessels of very light draught. About 6 miles farther to the south-west is the bar of the Rio de San Miguel. The town of Santa Anna stands on the northern point of entrance, and here the produce of the surrounding country is shipped in small coasters. At a little distance seaward the roads about Santa Anna may be seen. From the entrance to the Lagoa do Norte the low shore to the south-west is skirted close-to by the recife, forming Port Francez, and covering the mouth of the Rio de San Miguel.

At a mile off the south point of entrance to this river are some sunken rocks which extend to the south-west for 2 miles; the north rocks are occasionally uncovered. Inside them there is anchorage in fine weather in 2 or $2\frac{1}{2}$ fathoms water, sand and mud. The shore from the San Miguel runs to the south-west for 15 miles to the bar of the lagoa Jiguiá; midway is Azeda point with a few cocoa-nut trees on it; it projects a little, and shoals extend off it for $1\frac{1}{2}$ miles with 7 fathoms water close to them. The lagoa Jiguiá extends north-westward for a distance of 11 miles, where the river of the same name falls into it. The lagoon is $1\frac{1}{4}$ miles wide, and has from 6 to 17 feet water, the former depth is carried into it. It is navigable at high water springs for country vessels of about 80 tons.

Coasters anchor outside the bar. The coast is about 80 feet high, nearly level, tolerably wooded, with several reddish cliffs, and a sandy shore; immediately within the land is formed into several lakes or lagoons which have a small outlet to the sea. The 10 fathoms line of soundings extends along the coast at a distance of about one to 3 miles, coral bottom, but there are several rocky patches within the former distance, and the depth increases gradually seaward for 15 or 18 miles, where there are from 22 to 27 fathoms.

From the entrance to lagoa Jiguiá, the coast continues to the south-west for 10 miles to the mouth of the rio Coruripe, and 25 miles farther to the south-west is the bar of the rio San Francisco. It is all along low, sandy, and as far as 9 miles to the south-west of Coruripe point are several outlying dangers.

DOM RODRIGO ROCKS.—At about 3 miles in a S.E. $\frac{1}{2}$ S. direction from Coruripe point are the Dom Rodrigo rocks, seen at low water; these rocks are upwards of a mile from the recife fronting the mouth of the Coruripe, with 5 and $5\frac{1}{2}$ fathoms water between them and the recife. The Lages de Miahy is more than a mile in length with $3\frac{1}{2}$ fathoms on it, and lies $3\frac{1}{2}$ miles to the south-west of the Dom Rodrigo rocks, with Coruripe point bearing N. by E. $\frac{1}{4}$ E. distant 5 miles, $4\frac{1}{2}$ miles from the shore, and $1\frac{1}{2}$ miles from the sunken part of the recife. Between it and the latter there are from $3\frac{3}{4}$ to $5\frac{1}{2}$ fathoms water.

The Baixos de Japú is $1\frac{1}{2}$ miles in length north-east and south-west, and has only $1\frac{1}{2}$ fathoms water on it. It lies $4\frac{1}{2}$ miles from the shore, with the little hill of Japú, known by two cocoa-nut trees, bearing N.E. by N.; and Moita das Onças, a hill northward of Péba point, W. $\frac{1}{2}$ N. These dangers have 7 and 8 fathoms water close to them. It is not prudent to approach this part of the coast nearer than 11 fathoms.

CORURIPE POINT projects seaward forming a bay open to the south nearly a mile deep, where the river of the same name runs into the sea. A village and several cocoa-nut trees stand on the point. The point and bay is encumbered by rocks. At a mile E.S.E. of the point, the recife rises and extends for 5 miles along the coast at the distance of $2\frac{1}{2}$ miles; it is broken and uncovered from distance to distance, the south-west end having 4 feet water on it, with the hill of Miahy bearing N.W. $\frac{3}{4}$ N. and nearly midway between the hill and the lages of the same name outside it.

Inside the central part of the recife there are numerous sunken rocks. There is, however, anchorage in $2\frac{1}{2}$ fathoms water between the rocks and those in the bay. The passage in is between the north end of the recife and Coruripe point. There is also anchorage with southerly winds in $2\frac{3}{4}$ fathoms water on the north side of Péba point, protected by the reefs. The point has two or three houses and some cocoa-nut trees on it.

RIO SAN FRANCISCO.—The source of this river is near the city of Villa Rica or Ouro-Preto, about 240 miles N.N.W. of Rio de Janeiro; it is one of the largest rivers in Brazil, and is said to be navigable in many parts of its course, which runs to the northward nearly parallel to the coast. The river loses its depth and rapidity as it approaches towards its mouth through the flat country; but is subject to great inundations between March and September, when the stream is very strong. The surrounding country, near the mouth, is well populated, and abounds in sugar, cotton, wood, and tobacco.

The principal town in the neighbourhood of the coast is Penedo, on the left bank of the river about 22 miles from the bar. The north point of entrance, and the coast northward of it, is of low quick-sand without vegetation. Manguinha, the south point of entrance, is low, flat, covered

with mangroves, and projects to the S.E. ; heavy breakers extend seaward from both points for $1\frac{1}{2}$ miles. The passage over the bar is between the breakers, in a depth of 9 feet at low water. There is anchorage outside the breakers where vessels wait for a pilot, whose assistance is necessary. Inside the bar the water deepens to $4\frac{1}{2}$ fathoms, and it is more or less deep between the banks of the rivers and the numerous islets in it for many miles. Abreast Penedo there are $5\frac{1}{2}$ fathoms water.

The COAST.—From the entrance to rio San Francisco, the low coast runs to the south-west for about 49 miles to the bar of the river Cotinguiba. At 6 miles from the mouth of the San Francisco is a small opening in the shore called Barra Nova, which discharges water during the rainy season ; at 29 miles more to the south-west is the little rivulet of Japarutuba ; and about 14 miles farther on is the mouth of the Cotinguiba. The shore between is backed by the Serra de Pacatuba, and farther in the interior, to the west and south-west, are the Serras de Coratinho and Itabayanna, which are seen only in clear weather.

To the north-west of Cotinguiba bar is mount Aracaju, remarkable from a cut or notch at its northern extremity ; and W. by N. $\frac{1}{2}$ N. from the bar is the Morro de Telha, in the form of a cardinal's hat. Vessels should not approach this part of the coast too near, as with strong south-easterly winds it would be difficult to gain an offing. The beach is flat, and the bottom hard sand.

RIVER COTINGUIBA, or Cotandiba, is said to have 16 feet on its bar at high water springs, is much frequented, and navigable for small vessels as far as Maroim. At short distances within its entrance it receives the waters of several smaller streams.

The approach to the river may be known by the Morro de Telha, by mount Aracaju, and also by the signal tower at its entrance, which is conspicuous. When mount Aracaju bears N.W. by W. $\frac{1}{2}$ W., being off shore 2 or 3 miles, in 5 or 6 fathoms water, the bar of the river will bear about E.S.E. As vessels cannot get under way from the anchorage in the river before the ebb tide begins, and as much time may be lost before reaching the bar, they ought not to draw more than 11 feet ; and vessels of this draught are often considerably delayed. There is a steam tug vessel here of 150 tons register.

A large tower, with a flag-staff, stands on the beach close to the water, at the entrance to the river, from which the following signals are made to vessels intending to enter. A flag at the mast-head denotes—vessel seen from the shore. A flag at the mast-head, and another on a staff at an angle of about 45° , denotes—vessel is to tack to the northward or southward, according to the direction of the staff. Two flags at the mast-head, denotes—vessel is in a good position for the bar, tide favourable, and to steer direct for the tower or signal-post, and the signal will remain flying

even after the vessel has passed the bar. If one or both flags be hoisted and hauled down again, the vessel is to stand off.

If the master of a vessel has never been in the Cotinguiba, he should not enter without a pilot, or avail himself of the signals, unless in case of absolute necessity. The pilot boat is a fore and aft schooner. There is good anchorage northward of the bar in 6 or 7 fathoms water, fine hard sand, and in 4 fathoms for small vessels over mud and fine sand with the red light in sight; but vessels should, if possible, always remain under way, and if too late for the pilot to come off that night, still they should make the signal and stand to sea, keeping well to the northward or southward according to the monsoon, and be in a position to meet the pilot in the morning.

LIGHT.—A light is exhibited from the signal staff at the entrance to Cotinguiba river, at the height of 115 feet above the sea, visible from 6 to 9 miles. The light shows *red* to the eastward, white to the south-east, and pale *green* to the southward. The light will disappear whilst the lantern is being trimmed.

RIO VAZABARRIS or Sergipe.—At about 14 miles to the south-west of the mouth of the Cotinguiba is that of the Vazabarris or Sergipe. The entrance from the south-eastward may be known by three small hills, of equal size, covered with brushwood, called Os Tres Irmaões (the three brothers), at about 9 miles to the south-west. The river derives its name from the town of Sergipe, at the foot of these hills, on one of the branches of the river. At the bar of Vazabarris the signals are nearly similar to those at the Cotinguiba. The channel into the river carries from 10 to 12 feet at springs; both entrance-points are surrounded with breakers, and the south point is known by the whiteness of the sand.

RIO REAL.—The mouth of this river lies about 21 miles south-west of that of rio Vazabarris; it cannot be seen from sea, but will be known by the breakers on each side. Mango Secco, the south point of entrance, extends from a beach of white sand, called by the coasters the Prancha, or Plank of rio Real. The bar carries 15 feet water at springs, but there is generally a heavy sea, and it should not be attempted without a pilot. In the vicinity of the bar there are a few houses seen seaward at the distance of 2 miles. Within the bar the river turns abruptly to the south-west, and afterwards receives the waters of other streams.

RIO ITAPICURU.—At about 21 miles south-west of the bar of rio Real is that of Itapicuru, obstructed by breakers, and said to carry 7 or 8 feet at high water. There is a village on the south point of entrance, and another some distance within. With the river bearing about West some downs will be seen over it a little higher than those to the right or left. Small coasters and jangadas enter this river.

THE COAST from the bar of Cotandiba runs to the south-west for about 35 miles to the mouth of the rio Real ; from thence it trends more southerly to a little beyond the parallel of 12° S. At 6 or 7 miles from the bar of Itapicuru, a series of small hills, called the Oiteros de San Miguel, borders the coast to the south-west. From about the parallel of 12° S. the shore again runs to the south-west for 40 miles to the tower of Garcia de Avila, a sort of fort with a signal post, standing among trees on rising land, and the most remarkable object on this part of the coast ; at about 8 miles northward of it is mount Massarandupio.

From the tower of Garcia de Avila the coast continues to the south-west for 33 miles to Itapuan point, on which is a small village ; and thence about W.S.W. for 11 miles to Cape San Antonio. It is all along composed of sandy downs, varied by small brushwood and cocoa-nut trees, with a white sandy shore, bordered by the Recife, many parts of which are always above water, appearing detached from the coast like islets ; particularly those about Itapuan point.

The shore may be approached to the distance of a mile in 11 to 14 fathoms water, mud, sand, and coral. The water deepens suddenly, and at 10 miles from the land in places there is no bottom with 35 fathoms. In about lat. $12^{\circ} 30'$, at 8 miles from the land, there is no bottom with 60 fathoms.

CAPE SAN ANTONIO, the south-west extreme of the land forming the eastern side of the entrance to Bahia, is of moderate height, covered with trees, and can be seen in clear weather from a distance of 30 miles. The whole of the land in the vicinity of the cape is higher than that to the westward. Fort San Antonio, with the lighthouse, stands on the extremity of the cape ; and at 3 miles eastward of it, on the westernmost of three or four brown looking bluffs, is a flag-staff ; and eastward of the flag-staff is another low brown bluff, with cocoa-nut trees on it, called Itapuanzinho point.

When coming from the northward and eastward, Cape San Antonio will be shut in with the signal bluff, and when first seen at a distance appears a little separated from the main land. Between the signal station and the cape are many houses. The landing on this part of the coast is difficult, and here the Recife terminates.

WINDS.—During the northerly monsoon, between the parallels of 10° and 13° S., the winds have a daily variation. At night the land wind is seldom felt outside the reefs ; but at the approach of day it freshens and unites with the trade wind, which inclines to the northward until noon ; after that hour the wind veers again to the eastward, making an angle of about two points between that of the morning and that of the evening, which a vessel in working to the northward should take advantage of.

CHAPTER III.

BAHIA TO RIO DE JANEIRO.

VARIATION, 6° 10' West to 1° 50' West in 1864.

BAHIA or SAN SALVADOR.—The entrance to Bahia de Todos os Santos or bay of All Saints, $4\frac{3}{4}$ miles wide, is formed on the east by Cape San Antonio and on the west by Itaparica island. The bay extends to the northward for 25 miles, and its greatest breadth is about 20 miles, having sundry islands at its head, with several rivers running into it. As a place of call for vessels in want of repairs or supplies of any kind, Bahia is very convenient; it is healthy, easy of ingress and egress, and without the aid of a pilot; nor does there appear any difficulty of vessels getting to the southward from this port, on account of the tendency of the winds from that direction from March to September, as they generally draw well to the eastward and more so to the southward.*

The town of Bahia or San Salvador, the capital of the province, was founded by Thomas de Souza, in 1549, and stands on elevated land on the eastern side of the entrance to the bay, about 2 miles north of Cape San Antonio. It is built on the ridge and declivity of the land facing the anchorage west of it, and consists of an upper and lower town. The Cidade Alta, which includes the suburbs of Bomfim and Victoria, contains several fine streets, where the principal merchants reside. The Praya or Cidade Baixa consists principally of one street of considerable length, and contains the magazines and warehouses for inland produce and foreign goods; the streets in this part of the town are narrow and dirty, but of late years have been much improved. Here there is a naval arsenal.

In the fine season vessels can refit and repair at the usual anchorage. Lighters built for the purpose, with every necessary for heaving vessels down, are moored in-shore of the loading ground, and a vessel of 2,400 tons has been hove down here. To the northward round Monserat point, in Tapagipe bay, where there are merchant yards, a patent slip, and smooth water, vessels can be repaired at all times of the year. The public buildings are, the cathedral, in the upper town, built of marble, and said to be the handsomest building of the kind in Brazil, several

* See Chart:—Bahia de Todos os Santos, No. 540, scale, $m = 2$ inches; and Plan on Chart, South America, East Coast, No. 529.

churches, the palaces of the archbishop and governor, an ancient college, now the military hospital and a medical school, the town-hall, the tribunal of appeal, the theatre, several hospitals, a bank, exchange, &c.

The town and shipping are defended by several forts. The first is that on Cape San Antonio ; a little northward is that of Santa Maria and St. Diego ; at the south-west extremity of the town is fort Gamboa, with that of San Pedro, and farther on that of St. Phillip and the insulated circular fort San Marcello or do Mar, both protecting the naval yard. There are other smaller batteries along the beach, and one on Monserat point. On the land side the town is defended by forts and other fortifications.

The commerce of Bahia consists chiefly in the exports of sugar, cotton, rum, tobacco, coffee, cocoa, dye and fancy woods, hides, piassava, &c. ; and the imports of manufactured articles, flour, salt, iron, glass, wines, &c. In 1857, 317 vessels amounting to 95,193 tons entered inwards, and 315 vessels equal to 103,077 tons cleared outwards ; and in the same year the value of the imports amounted to 20,926,371 milreis, and the exports to 17,863,374 milreis.* In 1856, 452 vessels amounting to 69,908 tons, belonging to the coasting trade entered inwards, and 368 vessels equal to 50,184 tons cleared outwards. The population of the town and suburbs in 1861 was 152,000, of whom about 112,000 are mulattoes and blacks.

A line of English steam vessels run from this port to Southampton, also, French steam vessels to Bordeaux, and Brazilian steam vessels to the principal ports on the coast.

The principal passage into the bay is between San Antonio bank, bounding the channel on the east, and the reefs extending for 2 miles from Itaparica island on the west, and which borders the shore as far as the bar of Jaguaripe. The water is generally deep ; the fairway to the entrance has from 13 to 20 fathoms, and this latter depth will be found at nearly 2 miles westward of the town ; from thence to Itaparica island the water shoals, and at the distance of nearly 2 miles from it the soundings are irregular, with overfalls, and vary from $3\frac{1}{2}$ to 5 fathoms.

The bank Gamboa or Ciudad skirts the shore in front of the town, the outer part of which at the distance of 3 cables from fort Gamboa is marked by a red buoy in $2\frac{1}{4}$ fathoms at low water. Many vessels have grounded on this bank. At about three-quarters of a mile W.N.W. from the circular and insulated fort do Mar is the Panella, a rocky bank half a mile in diameter, with about 16 feet water over it, and marked by a large white nun buoy. There is good anchorage all round it. At half a mile N.N.E. $\frac{1}{2}$ E. of fort do Mar is the sunken wreck of a large French vessel burnt in 1856.

* The verage exchange of the milrei is about 2s. $3\frac{1}{4}$ d.

The anchorage for vessels of war is off the public garden, with fort do Mar bearing about E. by N., and fort Monserat N.E. by N., in 10 or 12 fathoms water, muddy bottom, at rather more than a mile from the shore, or if convenient a little nearer in. The Brazilian vessels of war anchor nearer the arsenal. Vessels moor in the direction of the tide, parallel to the coast, N.N.E. and S.S.W. Merchant vessels on first arrival generally anchor about a mile south-west of fort do Mar, until visited by the proper officers, when the hatches are sealed, and a berth in the discharging ground is pointed out for them to remove to. The discharging ground is between two imaginary lines running W. by S. from fort do Mar and the consulado, and extending about a mile off shore. The loading ground is to the northward of these lines.

It is seldom that the prevailing winds during the day will not permit a vessel reaching the anchorage at Bahia without tacking, as the most common are those from east and south-east. In the southerly monsoon only, and principally in the months of July, August, and September, they sometime veer to the south-west, and cause much sea, particularly at the change of tide; but this does not last long, and happens only at the time of new or full moons.

During the night the wind is weak, variable, and generally off the land. In the morning, during the fine season, it is from North to N.E., and often fresh, which cools the atmosphere, and after an hour's calm is replaced about 10 or 11 o'clock by the wind from E.S.E. to S.E. In the evening at sunset it falls light, and at 8 or 9 o'clock it blows in little gusts from the head of the bay until sunrise, when it veers to the North and N.E., and freshens.

Supplies.—Vessels will find at Bahia the means of providing for all their wants, but, with the exception of fresh meat, vegetables, and fruit, the charges for everything are high, particularly for naval stores. Water may be obtained between the town and fort Gamboa under the public garden, at other places, and by tank-vessels. Provisions and the necessary refreshments for shipping are easily procured. The market is about midway between the custom house and consulado near the water side, and well supplied with poultry, fish, fruit, vegetables, &c. Wood for fuel is abundant, and there is plenty of coal.

LIGHTS.—A light is exhibited from fort San Antonio at the height of 140 feet above high water, and in clear weather begins to be seen as a faint light from a distance of 13 or 14 miles. The light is *revolving*, showing two white faces and one *red* in succession, which are distinctly seen at about the distance of 6 miles, the interval between each face being *eighty seconds*; the red light will thus be visible once every four minutes. A *fixed red* harbour light is also exhibited from fort do Mar,

SAN ANTONIO BANK.—An irregular shaped shoal, composed of red sand and coral, is the principal danger in entering the anchorage at Bahia. It extends north and south 4 miles, and its greatest breadth is about a mile; the general depths over it are 4 and 5 fathoms, but on the north end of the bank, at about three-quarters of a mile S.S.E. from the lighthouse, there are only 16 feet water; and the same depth will be found on the south end of the bank at 4 miles S. $\frac{1}{4}$ W. from the lighthouse. The bank is steep-to, and in places with strong winds the sea breaks. From the depth of 5 fathoms at the south end Cape San Antonio bears N. $\frac{1}{4}$ E., distant $4\frac{1}{2}$ miles; and at one mile southward of it the depths are from 17 to 20 fathoms; along the eastern side at the above distance nearly the same depths will be found, decreasing to 6 fathoms close to the bank.

In fine weather and smooth water, vessels of about 15 feet draught constantly pass over the bank, but it is dangerous with southerly winds and any sea. The north end is nearly a mile from the green rocky point next East of the cape, with a channel between carrying $5\frac{1}{2}$ and 6 fathoms.*

TIDES.—It is high water at Bahia at fort do Mar, full and change, at 4h. 15m., and the rise is 8 feet. The flood runs 5 hours to the northward, and the ebb 7 hours to the southward. The velocity of the tide is about $1\frac{1}{2}$ miles an hour, increasing to $2\frac{1}{2}$ and 3 miles during springs.

DIRECTIONS.—Vessels bound for Bahia during the southern monsoon, should make the morro San Paulo, page 76, and then steer to the northward. When Cape San Antonio is seen, bring it to bear between North and N.N.E., and when at the distance of 8 or 9 miles from the lighthouse keep it a little eastward of the latter bearing, and steer to the northward with the lighthouse on the starboard bow, which will carry a vessel $1\frac{1}{2}$ miles westward of the south end of San Antonio bank, and the least depth of water will be about 11 fathoms. Monserat point, open of fort St. Maria, will also lead well clear of San Antonio bank.

As the strong sea breezes force the waters into the bay northward of the morro San Paulo, a vessel sighting that light should not bring it to bear southward of S.W. $\frac{1}{2}$ W. nor approach Itaparica island nearer than 11 or 12 fathoms water, and westward of Bahia it will be safe to stand only about half way across.

During the northerly monsoon the coast should be made about 10 miles northward of Itapuan point, where there is a large building like a factory close to the beach; or if from the northward, when on the parallel of $12^{\circ} 30'$ or $12^{\circ} 40'$, at about 20 or 25 miles from the land, a hill of moderate height

* E. G. Dent, commander of the ship *Cambrian*, 1854.

will be seen above the horizon, and nearer the coast a series of white sandy downs interspersed with verdure ; advancing a little to the southward is a down much larger than those north of Itapuan point. Continuing along the coast at the distance of 3 or 4 miles, a vessel will pass several other downs and Itapuanzinho point, remarkable by the cocoa-nut trees on it, and where the coast trends westward. Here the shore may be approached nearer.

The land in the vicinity of Cape San Antonio will first appear like detached trees, until a mound like a round island rises. Steer along the coast to the westward at a distance of 2 or 3 miles. Cape San Antonio will open when bearing about W.N.W., and when it bears N.W. $\frac{1}{2}$ W. steer for it. When $1\frac{1}{2}$ miles from the lighthouse, and about half a mile from the shore, keep at that distance from the latter, make allowance for the tide, and a vessel will pass the north end of San Antonio bank, and may haul round fort San Antonio, at not less than 3 cables distant, for the anchorage, the least depth of water being $5\frac{1}{2}$ fathoms ; at one-third of a mile from the shore there is not less than 7 fathoms. The discoloured water over the north part of the shoal is plainly seen.*

The usual course, however, is round the south end of the bank, with mount San Amaro, the highest hill of Itaparica island, on with the first hill in the plain of Conceição, on the same island, bearing N.W. by W. $\frac{1}{2}$ W.; the bank should not be approached nearer than 12 fathoms water ; and the distance of at least 5 miles from the cape should also be carefully estimated and the lead kept constantly going. When the lighthouse is on with the convent on the hill bearing N. by E., a vessel will be to the westward of the bank, and may steer for the anchorage as before.

In working, a vessel should not stand farther eastward than to bring the church of Bomfin on with Cape San Antonio, nor to the westward nearer Itaparica island than about $2\frac{1}{2}$ miles. Jaburu point, the east extreme of the island, mount San Amaro, Cape San Antonio, &c. will be easily recognized. In approaching the parallel of the lighthouse especial care should be taken not to stand too far westward, as the channel is narrowed to about 2 miles in breadth, and several vessels have grounded on the banks by standing too close to point N^a S^a da Peña. The reefs are not always indicated by the breakers, as in fine weather and at the moment of high water the sea sometimes does not break.

A sailing vessel leaving Bahia with a southerly wind and bound to the northward will find the north channel convenient, as it saves a beat

* Captain Sir Thomas Pasley, Bart., H.M.S. *Curaçoa*, 1843, and who says, the sand-hills to the north-east of Itapuan point are excellent marks in making the land from the northward.

to the southward of 5 or 6 miles ; but a vessel should have a commanding breeze and make full allowance for the flood tide. The land wind generally fails or falls light under the high land of the cape, but this will not affect a steam vessel.

RIVERS.—The principal rivers which fall into Bahia de Todos os Santos are the Vermelho, the Serigi or Sergipe, navigable 9 miles above its mouth ; the Jacarahy, Assu, Piraja, Matuim, Pitanga, Para Mirim, and the Para Guassu the largest, which irrigates the land in its vicinity, and which is known by its richness and fertility. The source of the Para Guassu is in the serra da Chapada, and after several falls it passes the town of Cachoeira and empties itself into the north-west part of the bay. It is navigable to the above town at 54 miles from its mouth, and is studded by numerous boats. The marshes of its banks are often inundated, which cause intermittent fevers ; the water is not good for drinking, and should not be used for several days after it is procured.

ITAPARICA ISLAND, on the west side of entrance to Bahia, is about 14 miles in length, N.N.E. and S.S.W., and 4 or 5 in breadth. It possesses a very good soil, supplies the market of Bahia with a great portion of its fruit and vegetables, and the interior abounds in cocoa trees, whose fruit is of a large size and forms an important article of trade ; there are also manufactories for rope, and other articles. The island is divided into two parishes, has several churches, and its population may be about 20,000 ; the principal town and general mart at the northern end is defended by a fort, and keeps up a communication with Bahia.

On the east side, opposite the town of Bahia, are numbers of handsome-looking houses. The fishermen here collect bait by means of torch light ; they assemble on the beach at low water, each man with two or three torches made of plaintain leaves, and thus obtain the required bait by illuminating the beach.

Jabura point, the east extreme of the island, is bordered by extensive reefs with from 8 to 12 fathoms water close to ; between which and the anchorage at Bahia the water deepens to 25 fathoms, soft muddy bottom. The south-east shore of the island is skirted by reefs steep-to, and from Caixapregos point, its south end, the rocks extend off some distance with broken water, and a set towards the bar of Jaguaripe is generally felt,* rendering an approach nearer than 5 miles dangerous.

THE BAR OF JAGUARIBE, the western entrance to Bahia, is formed by Caixapregos point, the south-west extreme of Itaparica island, and Garcia point on the main land. It is said to be narrow, tortuous, shallow, and

* Commander Boys, *H.M.S. Express*, 1854.

not easily distinguished; a red buoy marks its entrance. It is frequented by small vessels and coasters acquainted with its navigation. The rio Jaguaripe has its source about 33 miles westward of the town of Cachoeira, and is navigable with the tide about 22 miles above its mouth.

To the eastward of the bar is the Barra Falsa, a small inlet of the island between Aratuba point and that of Caixapregos. Aratuba point, at a distance of more than 14 miles, has a similar form to that of Cape San Antonio, appearing like the latter to detach itself from the land westward of it. The whole of this part of the coast is bordered with shoals and rocks, and in places from the depth of 10 fathoms, the water shoals rapidly. A vessel getting into less than 11 fathoms water should tack immediately.

ASPECT.—Between Bahia and the Itacolomis the coast is of moderate height, composed alternately of sandy beaches, small woody hillocks, and sometimes of reddish cliffs from 65 to 165 feet high. In the interior from distance to distance are summits of mountains from about 1,640 to 1,970 feet high, but which, from their remoteness from the sea, appear from the offing above the horizon like isolated hills, and seen a little sooner than the coast.

La Serra Grande, in lat. $14^{\circ} 30'$, between Ilheos and Contas, is the only group of mountains near the sea. The coast can be seen at a distance of 21 to 27 miles, according to the locality and the state of the horizon. The mouths of the rivers will be known by the breakers on the bars, which extend off from one to $1\frac{1}{2}$ miles. The remarkable points, in the absence of other observations, which serve to fix a vessel's position, are the morro San Paulo, the paps of Boypeba, isle Quiepe, the high dark cliffs of Contas, the Serra Grande, Ilheos, the mountains of Comendatubu, the high red cliffs of Porto Seguro, and lastly mount Pascal.

The water is all along deep, and at two miles from the shore there are from 11 to 16 fathoms; at from 6 to 8 miles, 55 fathoms; and at 15 miles, about 110 fathoms; but in proportion as we advance to the southward the soundings diminish a little. The nature of the bottom is nearly the same at 2 or 3 miles from the shore; it is a mixture of sand and gravel, or coral and broken shells; a little mud is found near the mouths of some of the rivers, but this is rare.

There are in four different places, at 2 or 3 miles from the coast, some coral banks. They lie between Bahia and the morro San Paulo; Boypeba and Camamú; the Ilheos; and between Santa Cruz and Porto Seguro. With the exception of these four places, the coast is safe, and a vessel may approach in moderate weather to a distance of $1\frac{1}{2}$ or 2 miles, in 6 fathoms water.

WINDS.—The coast between Bahia and Rio de Janeiro lies within in the limits of the trade winds, which prevail from the eastward; but as

their southern limit is approached they become variable, and the monsoons from the N.E. and S.E. are well marked, especially in the neighbourhood of the coast.

The rotation of the trade winds computed from 120,000 observations by Vice-Admiral Chabannes of the French Imperial Navy, tends to show that during the month of December, when they have reached their most northerly course, they commence to veer regularly to the southward; the mean direction is then about E. by N. or East on the parallel of Bahia, and N.E. on the parallel of 21° S. a little northward of Cape St. Thomé; in April they are E.S.E. on the parallel of Bahia, and East or E. by S. on that of 21° .

In April and May the change is more sensible, and continues so until July, when they reach their most southerly course. The winds then blow from S.E. by E. to E.S.E. on the parallel of Bahia, and from East to E.S.E. on that of 21° . At the end of July they begin to veer to the northward; the change is more rapid in the first months; then it continues regularly until December. The average variation is about five points; it is greater to the southward, and on the coast, than seaward.

In January off Capes Frio and St. Thomé there are 73 and 74 per cent. of N.E. winds, against 4 and 6 per cent. of those from S.W., this is the most unfavourable time for vessels bound to the northward. In December, when the N.E. winds are the strongest, they are only 54 and 52 per cent., against 11 and 17 of S.W. winds. In May there are only 23 and 40 per cent. of N.E. winds against 26 and 21 per cent. of those from the S.W.; this is the most favourable time for vessels bound northward. In July, when the wind begins to veer to the northward, there are 43 and 46 per cent. of N.E. winds, against 20 and 22 of S.W.

Off the capes the S.E. winds are the most frequent in October and November, March, April, and May; but in October they prevail the most, being then 24 and 30 per cent.

S.E. MONSOON.—The average direction of the trade winds varies three points between summer and winter, and those in the last season from April to September, called the S.E. monsoon, are generally replaced by variables from South to West, which are the termination of the pamperos of La Plata. They bring clouds and rainy weather, but arriving in this latitude they lose their strength, and last only two or three days, with squalls of some hours' duration, which are succeeded by calms and fine weather, if the wind veers to the S.E. and East.

Besides squalls from the S.W., there are often those from the S.E. in the vicinity of the Abrolhos islets, and also from the N.W. with rain and thunder, which is felt equally along the coast, and in general a little seaward. During this monsoon between Bahia and Rio, at 90 to 120 miles from the land, the winds are light and variable, with squalls and rain from

the S.W., thunder storms from the N.W., and variable winds from East to South. This is the best time of the year for proceeding to the northward.

The barometer will fall 24 hours previous to S.W. winds, and rise with those from the East. The rain and wind from the S.W. are more frequent at the time of new or full moon; an index of the weather will also be found in the general laws of the evolution of the winds in the southern hemisphere. If during bad weather the wind follows its regular course against the hands of a watch, and veers from S.W. to S.E. and East, it is a sign of fine weather; but if it veers from S.W. to West and N.W., bad weather may be expected.

N.E. MONSOON.—The N.E. winds commence in September, but it is not until December and January that they acquire their full force, when they are often fresh, but it is rare that within 30 or 45 miles of the land they blow hard for more than two or three days, and where the winds are generally more moderate, allowing coasters to work to the northward. During this season the weather is fine, the sky clear, but the horizon hazy.

In the vicinity of capes St. Thomé and Frio, the winds during summer often blow very fresh from the N.E., causing much sea and a strong current. The small steam packet boats can hardly go against it, and they are often obliged to seek shelter. These strong winds which pass over the low land of Cape St. Thomé are checked by the high mountains of Macahé, and are not felt westward of Cape Frio.

LAND WINDS.—On all this part of the coast the land winds are felt in fine weather, but they are in general very light. From Bahia to Espirito Santo the land being rather low and swampy, accounts for the lightness of these winds, and which is a great inconvenience to the coasters frequenting the small ports and rivers, as they are often detained a long time in consequence. From Espirito Santo to the southward they acquire a little strength, and assist vessels in entering and leaving the different ports.

ROUTE to the SOUTHWARD.—Vessels bound to the southward for Rio de Janeiro will probably meet with a N.E. wind on about the parallel of Cape St. Thomé, but from April to June the chances are the least, there being in the former month 32 and 46 per cent. of N.E. winds, against 23 and 17 per cent. of those from the S.W.; and in the latter month there are 38 and 48 per cent. of N.E. winds, against 28 and 23 per cent. of those from the S.W. In June, at 240 to 300 miles from the coast, there are 48 and 34 per cent. of N.E. winds, against 10 and 16 of those from the S.W., and 26 and 30 per cent. of those from the S.E. At all other times of the year the winds are favourable for descending the coast.

MORRO SAN PAULO.—From Garcia point, at the west entrance to the bar of Jaguaripe, a low, sandy coast, bordered with reefs, trends to the south-west and south for about 15 miles to the entrance of the river Una, and forms a deep bay. On the south-east side of the entrance to the river is the north extremity of Tinharé island, called the morro San Paulo, a high rugged conspicuous bold headland projecting to the north-east and terminating in nearly a perpendicular cliff, with low land to the back and northward of it. On the summit of the cliff is a lighthouse, and at the extreme point of the base is the ruins of an extensive fort.

The land southward gradually declines in height, and at half a mile south-east of the morro point is a low islet, and outside it, at three-quarters of a mile eastward of the fort on the morro point, is the north end of a reef of rocks, which skirts the coast to the southward, steep-to, and on which the sea breaks heavily. The shore, north-west of the morro, forms a deep inlet easy of access, and affords shelter for a large number of vessels. At about $1\frac{3}{4}$ miles within is the village of Gamboa, and about 7 miles up the river, on the right bank, is the town of Valencia, which has a weekly communication with Bahia. The Una has many branches, with several small towns on their banks, and is navigable some distance for small steamers.*

The entrance to the inlet north-west of the morro is contracted to about three-quarters of a mile in breadth by an extensive sand bank bordering the low western shore, and at $1\frac{1}{4}$ miles southward of the morro, the channel is narrowed to about a quarter of a mile. The bank shoals gradually at the outer part, but is steep-to farther in; the sea breaks on it, and its south side is partly dry. At about $1\frac{1}{2}$ miles S.W. by W. from the morro, its edge trends to the westward; it is steep-to, and terminates close to the western point.

The eastern shore immediately within the morro is steep-to; at the distance of about half a mile to the south, a bank commences and borders the shore to the southward at from about one to 2 cables; in the south-west part of the inlet it trends to the northwards, leaving a passage about half a mile wide between it and the low western point of the inlet. Water may be obtained here in small quantities. Near Valencia is the beginning of a natural canal, which at high tide admits boats to navigate as far south as the rio Jiquié, which has its outlet southward of Tinharé island.

LIGHT.—On the high cliff at the northern extremity of the morro San Paulo is a lighthouse 80 feet high, painted white, and exhibits at the height of 276 feet above high water a *revolving* white light, visible in clear weather from a distance of 20 miles. The light revolves every

* See Plan:—Anchorage of Morro San Paulo, on Sheet 5, No. 529.

minute, showing a bright light for *fifteen seconds*, followed by an eclipse of *forty-five seconds*. At a less distance than 12 miles the eclipses are not total. Care should be taken not to mistake this light for that at Bahia, 30 miles to the north-east. Sometimes, when the lighthouse is first seen above the horizon, it appears like a vessel under sail.

TIDE.—It is high water in morro San Paulo inlet, full and change, at about 4h. 0m.; and the rise is $6\frac{1}{2}$ feet. The ebb is much stronger and lasts longer than the flood; it sets rather towards the morro point, along the coast by the old batteries, at the rate of one to 2 knots, and sometimes 3 to $3\frac{1}{2}$ knots.

DIRECTIONS.—Vessels from the northward, bound for the anchorage of morro San Paulo, should keep Bahia light bearing northward of N.E. and not stand into less than 11 or 12 fathoms. When between 2 and 3 miles eastward of the morro light, bring it to bear W.S.W. or S.W. and steer in with the light a little on the port bow, gradually rounding it at a convenient distance, avoiding the bank extending from the western shore. In working in at night a berth should be given to the reef south-east of the morro, as there are 8 fathoms water close to it.

The least depth between the morro and bank on the western shore is 4 fathoms at low water, increasing to the south-west, in places to 12 and 18 fathoms. Anchorage will be found at half a mile south-west of the morro, or anywhere off a red cliff south-west of the village in $5\frac{1}{2}$ or 6 fathoms water; and, if necessary, a vessel can go higher up, where there is plenty of room for a large number of vessels, by steering along the southern shore. Vessels for the river should take a pilot. In working out with the ebb tide, a vessel should not stand too near the coast of the morro.

The COAST.—At about 30 miles nearly south from the morro San Paulo is Muta point, the east extreme of a deep bay. From the morro the land declines in height to the southward, and at the distance of 5 or 6 miles is Crapoa point, low and covered with dark green vegetation, by which it will be easily known; at 2 miles farther south is the little village of the same name, which is seen when passing near the coast. This part of the coast can be approached to the distance of a mile in 6 or 7 fathoms water, sand and broken coral. To the southward of Crapoa the coast is still lower, being a wooded plain as far as Boypéba island; the shallow water of $2\frac{1}{2}$ and 3 fathoms, does not admit vessels to approach nearer than 2 or 3 miles.

The land between the morro and Boypéba island, is that of Tinharé island, separated from the continent by a deep canal, which connects the rio Jiquié with the rio Una and the port of the morro. Two little rivers here run into the sea, but they are of no importance. The delta of the

rio Jiquié forms two other islands, one named Tupiassu lying between Tinharé and the continent, the other Boypéba.

BOYPÉBA or AS VILLAS.—At a few miles southward of the morro San Paulo, elevated above the horizon, at the extremity of the above lowland, is a group of low wooded hills appearing detached from the coast; this is Boypéba island, named also As Villas from its appearance, and lying between lat. $13^{\circ} 35'$ and $13^{\circ} 41'$; the land north and south of Boypéba is very low, by which the island will be known. The coast of Boypéba is bordered by a chain of reefs, which from the south-east point of the island named Castellanos, extends a mile from the land. At 2 miles from the point the depth is 7 fathoms, sand and coral.

In 1860 the reef was marked by a wreck. At night a vessel should not approach nearer than 11 fathoms water, as the soundings diminish rapidly. A little northward of Castellanos point there is a small village near the mouth of a river; small coasters approach tolerably near the reefs. There exist also north-west of the island, on the borders of the canal which separate Tupiassu island, another village of no importance, called villa Boypéba Velha. The island is well cultivated, and carries on a small trade with Bahia. From Castellanos point is seen, a little elevated above the horizon, the lighthouse of the morro San Paulo to the north, and isle Quiepé in the S.S.W.

BARRA CARVALHOS.—From Castellanos point the shore of Boypéba island trends to the W.S.W. and West, and forms at a distance of 4 or 5 miles a right angle with the coast of Camamú running north and south. Here at the head of the bight is the entrance to the canal which communicates with the rio Jiquié, the interior, and port of morro San Paulo. This entrance is named the Barra Carvalhos, and will be found by the hills of Boypéba and the low land of the continent.

To the south-west of Boypéba island is a small conical hill, isolated, and on its summit are three tall cocoa-nut trees which from a distance appear as one, they can be seen 11 or 12 miles off, and are useful as a mark for this part of the coast. The Barra Carvalhos is practicable only for small coasters of about 6 feet draught. Its approach is encumbered with large patches of coral, making it necessary to have a good pilot.

The coast between Boypéba and Camamú forms a bay 4 or 5 miles deep, terminating to the southward by the extensive reef named Sororocusso, which surrounds Quiepé isle. This bay is shallow, encumbered with detached banks of coral, and cannot be navigated without a good pilot. The shore is low, being a long beach of sand with no object to mark it. Vessels bound to the southward should give Castellanos point a berth of at least 2 miles, and not approach the land until on the parallel of Quiepé isle.

THE PORT OF CAMAMU, after Bahia, is the best on this part of the coast of Brazil, on account of its extent, depth, and shelter. Between Muta point and the reef from isle Quiepé, is the entrance to a bay (*Barra da Enseada*) extending to the south-west upwards of 3 miles, to the confluence of the rivers Camamú or Acarahi and Marahu. The entrance of the river Serinhaem is in the north-west part of the bay, but it is of no importance, being navigable only for boats.

Muta point is sandy, and has a group of cocoa-nuts on it, which are clearly seen from the offing; it is clear of danger on the east and north sides, but S.W. by W. $\frac{3}{4}$ W. distant 3 cables from its extreme is the Sioba rock, with about 2 feet on it at low water; and at $1\frac{1}{2}$ miles south-west of the point, and 5 or 6 cables from the beach, are the Itaipebus rocks, which dry at low water, with breakers nearly 2 cables north of them. A little west of the point is a small hill.

The navigable part of the bay is much contracted on the north by the reef and bank surrounding isle Quiepé, which extends to a mile north-west of Muta point. At $1\frac{1}{4}$ miles westward of the point, but northward of its parallel, are two rocky banks with about 10 feet water on them. The bay has from 3 to 9 fathoms water, and this latter depth will be found in the entrance of the Marahu. A small islet, with several rocks, lies at the entrance of the Camamú or Acarahi.

Muta point may be passed close to, and anchorage will be found in about 6 fathoms water, sandy bottom, a short mile westward of it, or farther to the south-west if necessary. The town of Camamú, defended by a fort, stands on the left bank of the Acarahi, about W. by S., 10 miles from the bay. It trades with Bahia, exporting coffee, cacao, spirits, rice, &c. The population is about 2,000.*

QUIEPÉ ISLE and SOROROCUSSU REEF.—In approaching the coast on the parallel of $13^{\circ} 50'$, there is no high land to mark the entrance to Camamú; but when about 15 miles from the land there will be seen in the north-west the wooded hills of Boypéba, in the west Quiepé isle, which appears like a group of trees divided into two parts, and the low point of Muta with a group of cocoa-nut trees on it. On a nearer approach the two little hills of Taipus, on the coast, at 4 or 5 miles south of the entrance to the port, will be seen.

Quiepé isle, about 330 yards in diameter, is covered with large trees reaching 155 feet above the level of the sea, visible at a distance of 14 miles, and easily known by its isolation from the main land westward, which is lower. It is surrounded on all sides by coral banks, called Sororocussu, extending one mile to the southward, $1\frac{1}{2}$ miles eastward,

* See Plan :—Port of Camamú, No. 549, scale, $m=2\cdot5$ inches.

and 2 miles to the E.N.E., and which narrows very much the entrance to Camamú; the sea breaks on the banks in all their extent when the wind is fresh from the offing, and particularly when the tide is contrary to the wind.

THE PRAGONAS and CAROÇOS BANKS.—These rocky banks lie 6 or 7 cables to the north-west of the anchorage, at from $1\frac{1}{2}$ to 2 miles W. by N. of Muta point. The two banks together are about three-quarters of a mile in length east and west, with about 10 feet on them at low water. To avoid them do not go northward of the line passing through the town of Camamú and the Cavallo rocks.

TAÏPUS HILLS.—In making the coast south-east of Camamú, the first land seen are the two little hills of Taïpus, situated near each other on the borders of the sea, at 5 miles southward of Muta point. They are very remarkable by their isolation on low and uniform land; they are not wooded, and are only large downs of sand.

ENSEADA de CAMPINHO.—This anchorage, farther in, is about half a mile from the beach, in $3\frac{1}{4}$ fathoms water, and is easy of access; but if it is necessary to go nearer the town of Camamú or that of Marahu, a pilot should be obtained at Barra Grande, as there are many dangerous rocks in the way. Small coasters anchor half way between the rocks Itaïpebas and Sioba.

Barra Grande is the name of the shore and village within Muta point, and off which is the principal anchorage. The village consists of about 20 houses, and there are some groups of cocoa nut trees in its vicinity.

CAVALLO ROCKS.—At three-quarters of a mile northward of Pedreira point is a group of rocks, some of which are several feet above the sea; the one most elevated is remarkable by its form, which has some resemblance to the head of a horse, from which it takes its name. When in line with the town of Camamú, it marks the south-east limit of Sororocussu bank.

Between the Cavallo rocks and the coast is a channel having about 3 fathoms water; and there is the same depth between the rocks and Pedreira point. The channel vessels use when bound to Camamú is named Barra Camamú.

CAMAMU ISLAND, in the inner part of the bay, is 3 miles in length north and south, and 2 miles in breadth. It is hilly, higher than the neighbouring shore, and divided into three or four parts by narrow channels, but which are not even navigable for boats. The east side of this island forms the left bank of the river Marahu; this so-called river is in reality an arm of the sea, which opens on the coast some miles southward of the Taïpus hills.

The small village of Marahu stands on the east shore of this arm of the sea, at about $1\frac{1}{2}$ miles southward of Pedreira point, the north extreme of Camamú island, and here the depths are 7 and 8 fathoms, and the river half a mile wide.

RIO CAMAMU or ACARAHÍ.—The mouth of this river is formed by Camamú island and the main land. The river descends from the chain of the Aymores, and is navigable about 20 miles above its mouth. In communication with its banks are numerous sawyers employed cutting timber, which is conveyed by the river to Camamú for Bahia.

From the depth of about 3 fathoms between the Cavallo rocks and Pedreira point, the water within deepens to 8 and 11 fathoms, when it again decreases.

TIDES.—It is high water in Port Camamú, at full and change, at 4 h. ; and the rise is about $6\frac{1}{2}$ feet. The tides are tolerably regular. The stream of the ebb, increased by the waters from the rivers which fall into the bay, is much stronger than the flood ; its average rate is from $1\frac{1}{2}$ to 2 knots an hour, and its direction is towards Quiepé isle and reefs. When the wind is fresh from the offing the ebb causes a heavy sea across the whole breadth of the entrance between Muta point and the Sororocussu reefs.

DIRECTIONS.—When bound to port Camamú, and having ascertained the vessel's position from the above objects, if from the northward, keep at least 2 or 3 miles eastward of the meridian of Castellanos point, until on the parallel of Quiepé isle, and in not less than 8 or 9 fathoms water ; this precaution is necessary as the swell from the offing, and the current sets on the reefs, and towards the bay to the northward.

When about E.N.E. $\frac{1}{4}$ N. of Muta point, and having it in sight, the hills, and rocks off Pedreira point, the north end of Camamú isle, will soon be seen, and also, at 10 or 11 miles inland, the town of Camamú standing on rather higher land. Then bring the town in line with Pedreira point, bearing W.S.W., and steer for it, (at some degrees to the right of this line is the large rock of Cavallo, situated northward of Pedreira point,) which will carry a vessel in mid-channel at half a mile northward of Muta point, and the same distance southward of the edge of Quiepé or Sororocussu reefs.

But if the town of Camamú is not visible, a vessel may steer in and pass 4 or 5 cables northward of Muta point ; and when Quiepé isle bears N.N.E. $\frac{1}{2}$ E. steer to the southward for about 2 cables, and anchor in $5\frac{1}{2}$ fathoms water, fine sandy bottom, at one mile from the beach of Barra Grande ; but it is necessary before anchoring to ascertain the nature of the bottom, as there are several patches of rocks.

In leaving the port advantage should be taken of the land wind. Bring the town of Camamú in line with Pedreira point, and steer out E.N.E.

cataracts, but navigable for large canoes about 15 miles above its mouth, except immediately after heavy rains, when the stream is too rapid. Its waters are said to be excellent for tempering steel, and the river is celebrated by gigantic bones which have been found in the ravines near its banks. *See note, p. 87.*

The mouth of the river forms a basin, and can be seen from the offing; it opens to the N.E., being covered to the east by the high land of the Trombina, and bounded on the west by the low coast and the sand-banks which obstruct three-quarters of its entrance, leaving only a narrow channel close to the Trombina. The depth of this channel is 8 feet at low water, and $14\frac{1}{2}$ feet at high water. When the sea is smooth it is easy to enter; the mark for going in is the point north of the Shere reef in line with the church, bearing W.S.W. $\frac{1}{2}$ S.; the water diminishes on the bar near the Trombina, and then rapidly increases in the basin to $5\frac{1}{2}$ and $6\frac{1}{2}$ fathoms.

The high land south of the entrance is covered with trees, and the town of the same name stands in the bend of the coast at one mile S.W. of the entrance to the river; it is masked from the offing by Trombina point until it bears southward of W.S.W.; when open it can be seen at a considerable distance, and is a good guide to the anchorage. It is the chief place of a district containing 3,000 inhabitants; the territory is reputed to be the most fertile on the coast. The largest coasters and steamers of the coast frequent this place, and often put in for refreshments.

At the distance of 5 miles from the coast there is no bottom with 100 fathoms of line, but once in soundings, they are regular to the anchorage.

THE ANCHORAGE off Contas, near the entrance to the river, is in 8 or 9 fathoms water, mud, with Cape Tromba Grande bearing S. $\frac{1}{2}$ W. distant 2 miles, and Contas church S.W. by W. $1\frac{1}{2}$ miles, at about one mile from the shore of Trombina and one mile N.N.E. of the rock Pedra Branca. The depths diminish regularly towards the bar. If necessary vessels may anchor farther out.

TIDES and CURRENT.—It is high water in the rio Contas, at full and change, at 4 h.; the stream of the ebb is very rapid, averaging 3 or 4 knots in the channel, which requires great caution in entering. During the N.E. monsoon the coast current is stronger in this vicinity than any other part, a vessel bound northward should therefore gain an offing.

PEDRA BRANCA.—There are two rocky banks off the mouth of the rio de Contas; the most distant from the shore is the Pedra Branca, with about 3 feet water on it at low tide; it lies 3 or 4 cables eastward of the Trombina, and does not always break. Vessels should approach the bar from the E.N.E. or N.E.

SHORE REEF.—The second reef, nearer the land and N.N.E. of the Tromba, is a large piece of rocks, uncovered at low water, and always breaks. Its proximity to the shore, and the breakers, render it less dangerous than the Pedra Branca: vessels leave it also to port in entering the Comaa. The pilots give as the leading mark from the offing, the point north of the Shore reef in line with the church, bearing $W \pm N. \frac{1}{2} E.$ which passes at equal distance the Pedra Branca, and the sand banks bordering the coast on the west.

THE COAST.—At 30 miles southward of Cape Tromba Grande is the little port of Ilheus. In this space the coast bends to the west, forming a curve 1 or 2 miles deep: the land between is high, with bluff points and peaked cliffs, steep, and safe to approach. At one mile from the shore there are from $5\frac{1}{2}$ to 11 fathoms water, sand and gravel.

At 5 miles southward of Cape Tromba Grande, near a bold steep point, the high land receding from the shore for 3 miles forms a deep valley, from the middle of which two little rivers run into the sea. Between the two rivers near the sea is a small conical isolated hill, at the foot of which is the little village of Tejupe; at 2 miles south of the village is the high peaked land forming the cape of Serra Grande.

SERRA and PUNTA GRANDE de CONTAS.—The Serra Grande is a chain of mountains running inland at right angles to the coast, and their two or three principal summits, at 5 or 6 miles from the sea, attain the height of 1,640 feet, and are visible from the offing more than 40 miles from the coast; the termination of this chain of mountains presents a sea front of elevated cliffs running 10 miles north and south.

The north point of these elevated cliffs is 9 miles S.S.W. of Cape Tromba Grande, near the valley and village. The point in the middle, the most salient, and known as Punta de Serra Grande, is a little north of the parallel of the summits in $14^{\circ} 29' S.$; it is steep-to, and at less than one mile from it there are 11 fathoms water, rocky bottom. The south point of the cliffs is named Punta del Ramo, and is 19 miles from Cape Tromba Grande. The village of Memouau stands on a narrow neck at the foot of the high land north of Punta de Ramo, but it is of no importance.

RIO ITAHIPE.—Ramo point terminates abruptly the high land of Serra Grande, and then follows a large valley 5 miles across, which separates the group of the Serra Grande from those of the Ilheos. This valley, larger and deeper than that to the north which separates the same group from the high land of Contas, is very remarkable from the offing, and called Aba da Lagoa.

In this valley is a large lake named Itahipe, and a river of the same name runs through it from the Serra Itaraca, and discharges itself into

the sea at 3 miles south of Punta del Ramo. At 5 miles southward of this point the low land of the valley is terminated by a bluff reddish point, which is the commencement of the high land of Ilheos.

SAO JORGE dos ILHEOS.—At 30 miles southward of Contas are two points a little salient, forming a small bay protected by a chain of islets and reefs, inside which is fair anchorage. In the south part of the bay the rio Cachoeira or dos Ilheos desembogues, but in its course, close to the sea, forms a peninsula. The south point of this peninsula is 197 feet high, named the Morro da Matriz Velha, and its extreme point Fucinho do Cão (dog's nose).

The right shore of the river is very low, forms a circle round this hill, and terminates also by a hill wooded close to the water with a rocky base, isolated, 131 feet high, and called the morro of Pernambuco, which being connected to the continent by a neck of land (Praia Zimbo) might at some distance be taken for an island. On the north-west side of the morro of Pernambuco are the ruins of batteries which formerly defended the port.

The entrance to the river is between the two hills, open to the north, and $2\frac{3}{4}$ cables in breadth, but narrowed by the Coroa Capão, sand banks deposited by the stream of the river on the western side of the channel, which, from 2 cables south-east of Fucinho do Cão, extend along the coast, terminating at the Rapa rocks lying half a mile northward of the morro of Pernambuco and $2\frac{3}{4}$ cables from the shore of the town. In entering the Cachoeira, a vessel should bring the morro of Pernambuco to bear about S.S.W. or S.W., and keep it aboard to avoid the breakers on the western shore, where there is always much sea, and especially when the tide is running out against the wind.

Within Fucinho do Cão the river trends to the north for about one-third of a mile, and then westward. The channel along by Pernambuco has about 10 feet at low water and 16 feet at high water, but it deepens in the river to 6 and 8 fathoms, sand and mud. The town of St. Jorge dos Ilheos stands on the north-west side of the Morro do Matriz Velha, where refreshments can be obtained at moderate prices. The only trade here is timber, cut at different distances up the river, and floated down for exportation.*

ISLETS and REEFS.—At rather more than $1\frac{1}{4}$ miles north of the entrance to the Cachoeira, is Pedra Grande point, where the land trends westward and northward, forming Trincadeiras bay. Parallel to the coast, at about the distance of a mile, are a chain of islets and reefs more than $1\frac{1}{2}$ miles in length. Ilheo Grande or Verde, 65 feet high, and 164 yards in

* See Plan :—Anchorage of Ilhéos, on Sheet 5, No. 529.

diameter, is the largest and northernmost of the group. It lies at less than $1\frac{1}{4}$ miles north-east of Pedra Grande point, and 2 miles N.N.E. of the morro of Pernambuco. It is covered with trees, and can be seen at the distance of about 15 miles.

Ilhéu Pequeno or Secco is about a cable south-east of the former, with a passage between. At three-quarters of a mile S.S.E. of the islets is a reef of rocks named Itaípins; they uncover, and the sea nearly always breaks on them. A second reef of rocks, rather larger, lies S. $\frac{1}{2}$ E. distant one mile from Ilhéu Grande, called Itapitanga. A third patch, the Sororoca, is covered, but does not always break, lies N.E. by E. a little less than a mile from the morro of Pernambuco, and $1\frac{1}{4}$ miles S. by E. from Ilhéu Grande. This is the last of the chain, and it forms with the morro the southern entrance to the outer anchorage.

These islets and reefs have channels of irregular depths between them, which can only be used with safety by boats.

DIRECTIONS.—St. Jorge dos Ilhéos is known, when on its parallel, by the Serra Grande to the N.W., and the two hills or morros of Pernambuco and Matriz; and on nearing it by a large white church standing about the middle of the ascent of the land, and the islets and rocks protecting the anchorage. A vessel may pass in north of Ilhéu Grande, or south of the Sororoca reef, according to the prevailing wind. To steer in northward of Ilhéu Grande, which is steep-to, pass 2 or 3 cables from it, and anchor when convenient in 5 or 6 fathoms water, mud and clay bottom.

A good berth is with the north part of Ilhéu Pequeno, the outer isle, just open southward of Ilhéu Grande, or a more convenient anchorage for communicating with the village, and equally safe, is farther south, with Pernambuco point bearing about West, and the Itaípins rocks southward of Ilhéu Grande in line with it bearing N.N.W., in 8 fathoms water, and a mile from any danger.*

In steering in south of the reefs, keep the morro of Pernambuco a little northward of West, and in line with the morro Matriz, which is higher and the most conspicuous. In running on this line a vessel will pass half a mile southward of the Sororoca reef; and when at the distance of half a mile from the land, in not less than 5 fathoms water, steer to the N.N.W. and anchor as before. Vessels in leaving can pass out north of the islets or south of the reefs, as convenient. The anchorage is most exposed at high water, when the sea passes over the reefs.

In crossing the bar of the river keep the bluff south point of entrance aboard: when the wind is fresh from the offing a sea sets in, and it breaks

* Commander Boys, H.M.S. *Express*, 1854.

across the bar, when the channel is all but impracticable. It is high water, full and change, at 4 h.

The **RIO ILHEOS** or **CACHOEIRA** descends from the chain of the Aymores, and runs into the bay of Ilhéos, after being divided into two parts about 30 miles above its mouth. Its bed is uneven, which renders it unnavigable beyond 6 miles from São Jorge, where there is a cataract from which it takes its name. Its principal affluents are the Itape and Santa Anna. Near its borders are found a number of the bones of the mastodon.*

THE COAST.—At about the distance of 62 miles nearly South from the morro of Pernambuco, at the mouth of the rio St. Jorge dos Ilhéos, is the rio Grande de Belmonte, with heavy breakers north and south of it. The coast between the two rivers runs about S. $\frac{1}{2}$ E., nearly straight; the northern part of it is of average height, formed alternately of wooded hills, small cliffs, and sandy beaches; but south of lat. $15^{\circ} 20'$ the land is low and wooded, with a white sandy beach as far as Belmonte, and backed at about 15 miles inland by the Serras de Itaraça and Commandatuba, which extend north and south for 20 miles, between lat. 15° and $15^{\circ} 20'$.

The northern serra is 1,476 feet above the sea; the middle one, 8 miles S. by W. of the former, is 2,034; and the southernmost, named the morro de Commandatuba, 1,903, is an isolated undulating mountain, easily known from the offing, and the best mark for this part of the coast; it is 8 or 10 miles S.S.W. of the middle one, and 16 miles from the sea, in lat. $15^{\circ} 21'$. These mountains will generally be seen about 36 miles from the coast. All this part of the coast can be approached to a distance of $1\frac{1}{2}$ or 2 miles; between Ilhéos and Olivença there are some small detached banks of coral, extending nearly a mile from the shore; but south of lat. $15^{\circ} 15'$ the coast may be approached to one or $1\frac{1}{2}$ miles in 6 or 8 fathoms water. At 3 miles off there are 17 and 19 fathoms.

Olivença, in lat. $14^{\circ} 58'$, a small Indian village, the first south of Ilhéos, is built in a picturesque manner on the summit and towards the north of a hill near the sea; the church of Notre Dame Escalier is on the highest part, and looks like a long stone staircase, from which it takes its name. Seen from the offing the village is conspicuous, and appears like a single line of houses descending the hill to the north. Numerous cattle are seen grazing here. In the vicinity, at three-quarters of a mile from the shore, are some reefs on which, from distance to distance, the sea breaks. The coast here should be approached with caution. At one mile off there are $5\frac{1}{2}$ fathoms water, and at 5 miles 11 to 14 fathoms, fine sand or sand and gravel.

The coast is broken by the mouths of numerous rivers, which are known when passing at about a mile from the shore by the breakers on

* In the greater portion of their organization the mastodons must have closely resembled the elephants.

the bars, and by groups of houses built generally in their vicinity ; but they are not of much importance, and, as well as the several villages along the coast, their names are often uncertain. At 3 miles southward of Olivença is the entrance to the rio Una, with some small breakers at 2 or 3 cables from the coast. A village stands at the mouth of the river. At 2 and 4 miles more to the south are two other rivers, probably the Jari and the Itapuan.

Between the two rivers is a low salient point, covered with groups of trees and cocoa-nut trees, which are conspicuous at a little distance. Some Indian huts are sheltered under the cocoa-nut trees. The rio Aqui, in lat. $15^{\circ} 6'$, has a small village north of the bar ; and at one mile south of it is a bank of coral and sand, which extends off nearly a mile. At a mile from the land the depth is $3\frac{1}{2}$ fathoms, but outside this distance there are $5\frac{1}{2}$ fathoms. The mouth of the rio Messo is 5 miles southward of the Aqui, and 2 miles north of it are some woody cliffs from about 80 to 100 feet high, with a small triangular white spot, which is very remarkable from the offing.

The rio Una Mirim, in lat. $15^{\circ} 14'$, has a village north of the bar ; and 3 miles south of it is the mouth of another river, but its name is unknown, probably the Aracari. At 2 miles farther on is the mouth of the rio Muruim, with groups of houses north and south of the bar. Between the two rivers is a conspicuous point, where terminates the extensive white sandy beach, and commences the forest bordering the coast. It is also a little to the south of the mouth of the Muruim, where terminate the hills and cliffs and commences the low land in the neighbourhood of the rio Commandatuba. In the interior, south of the Serra Commandatuba, the country is a flat.

The rio Commandatuba is a small river descending from the chain of mountains of the same name ; the bar is shallow, and accessible only to the smallest coasters ; an Indian village stands near its mouth. This part of the coast is low, with lagoons extending along the coast a mile inland ; these lagoons communicate with the sea, and form low islets, on which are several houses, and the village of Boa Ventura. The village of Commandatuba, peopled by indians, is 2 miles above the bar. Boats can go 2 miles above the village.

The rio Poxim, in lat. $15^{\circ} 35'$, admits boats at high water ; it communicates with the lagoons, on the north with the rio Commandatuba, on the south with the Barra Canavieiras and the rio Patype. All along this coast the soundings are $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms, sand and mud, at one to $1\frac{1}{2}$ miles from the shore ; 9 fathoms at 5 miles ; 14 fathoms at 10 miles ; in the offing the soundings decrease to the southward.

THE BARRA de CANAVIEIRAS, or mouth of the rio Pardo or Patype, in lat. $15^{\circ} 41'$, is the most important southward of Ilhéos. The land in

its vicinity is very low, but the river is easily known by a large wooden white tower on the north point of entrance, and which appears detached from the dark verdure of the coast, especially when the sun shines on it. A sand bank obstructs its entrance, but at high water there are three different channels, one on the north, one on the south, and another in the middle of the bank; this last is the deepest, which at high tide has from 15 to 16 feet water. Vessels anchor off the port in $5\frac{1}{2}$ fathoms water, mud, with the tower about West, distant one or $1\frac{1}{2}$ miles.

This port is frequented by coasters, and a bar master is always ready for the service of vessels when they appear off it. The town of Canavieras stands on the left bank. The source of the river is in the province of Minass Geraes, where it divides into branches; one of which, the rio Cachoeira, disembogues at Ilhéos, whilst the other branch, the rio Pardo or Patype, runs into the sea and forms the bar of Canavieras. At some miles above the bar the Patype communicates by a natural canal, named rio Salsa, with the rio Grande de Belmont. During the rainy season it forms a second communication nearer the sea by the rio Jandia-hi, or Jundia-hi.

The rio Pardo separates the provinces of Ilhéos and Porto Seguro. It was between this river and the rio Grande de Belmont that the beautiful quarries of rose colour marble were discovered, about 20 years ago. The coast southward of Canavieras is low, wooded, and broken by the entrances into the lagoon, with here and there some small villages of no importance; they are named, Judiahi, Porto da Funte, Embarca, Farina, Poço, and the Barra do rio Marineiro. With the exception of the Serras of Commandatuba, which is seen in the horizon to the N.W., there is no high land, the country being flat and marshy.

BELMONTE, with a population of about 800 inhabitants, stands on the south point of entrance to the rio Grande de Belmont, the most easterly south of Bahia, but from the uniformity of the land and the town being surrounded by cocoa-nut trees, it is difficult to find from the offing. To the south of the entrance are some small round hills, and the breakers extend a mile from the bar. In the middle of the breakers is a small sandy islet visible 5 or 6 miles; it is at the north point of entrance, and if coming from the southward the remarkable group of trees is a good guide. The river will be known by a small opening in the sand, and about 10 miles from its mouth the water is sometimes much discoloured by large reddish spots.

The bar of the rio Grande de Belmont has between 6 and 7 feet over it at high water, it often changes, the shoals extend off upwards of a mile, it is at all times dangerous, and after rain the current sets out very strong. A pilot is stationed at the entrance to direct vessels in entering, by waving a flag to starboard or port, and holding it upright when steering the proper

course. In entering the river it should be approached on a N.W. by N. bearing. At $2\frac{1}{2}$ or 3 miles to the N.E. of the bar there are only $4\frac{1}{2}$ and 5 fathoms water, whereas to the S.E. the same depth will be found at $1\frac{1}{2}$ miles from it. Anchorage will be found off the bar in $6\frac{1}{2}$ or 7 fathoms water, with the village bearing about W. by S.*

The rio Grande de Belmonte or Jequitinhona, one of the most considerable in Brazil, rises in the Serra de Pedra Redonda, at 24 miles W.S.W. of the town of Serro, at 300 miles from the sea; its principal affluents are the rios Macauba, Itucambira, Vacaria, Salinas, Aracuahi, &c. Its bed is uneven, and it has two very remarkable cataracts. Diamonds are found in the upper part of its course. The river can be ascended to 240 miles from its mouth, but its navigation is little known; it produces numerous fish, particularly a large species of shrimps.

THE COAST.—From the mouth of the rio Grande the coast runs about S. by W. $\frac{1}{2}$ W. 36 miles to Porto Seguro. At some miles south of Belmont the rio Mugiquicaba, the principal of several small rivers on this part of the coast, disembogues in a small bay named Conchas, known by a group of isolated trees on the shore, resembling at a distance a large rock or islet. This part of the coast, although low, is higher than that to the northward. In the interior are some little hills, covered with trees, and which rise gradually in height to the southward; when the weather is clear the two mountains named Irmaões, in lat. $16^{\circ} 11'$, will be seen at 21 miles from the coast.

At 6 miles southward of the rio Grande is a remarkable group of trees, conspicuous from the offing, and on its parallel there are only 5 fathoms water at the distance of 4 miles; this shallow water continues south, at a greater distance from the coast, for 7 miles, when the edge of the bank trends towards the Araripe reef off San Antonio point, northward of Santa Cruz. From San Antonio point the coast is bordered, at a considerable distance off, by numerous dangerous reefs, which partly uncover at times, and extend southward to Porto Seguro.

There are passages between these reefs leading to San Antonio, Santa Cruz, and Cabral bays. The bottom for a distance of 10 miles off Porto Seguro is rocky and uneven, and the lead frequently becomes entangled in the rocks. It is necessary to be cautious in anchoring. At 8 miles from the coast there are from 14 to 16 fathoms water. A vessel should not approach nearer than from 4 to 6 miles, according to locality.

COAST REEFS.—A line of coral reefs border the shore from San Antonio point to as far south as the parallel of the church of Santa Cruz, a distance of 9 miles. The northernmost reef, named Araripe, surrounds

* Commander Boys, H.M.S. *Express*, 1855.

San Antonio point at the distance of $3\frac{1}{2}$ miles, and is partly uncovered. From thence southward the reefs continue in detached patches along a low and uniform coast, with nothing to mark it, and which should not be approached nearer than 4 miles, in 14 fathoms water, as when the winds are light the sea does not always break on the outer reefs; they are steep-to, and the lead is the only guide.

The Itassepanema lies N.N.E. and S.S.W., 2 miles in length, and 5 to 6 cables in breadth; it is nearly all uncovered, with the Coroa Alta, a sandy islet, rising from the middle, and fronts Santa Cruz bay, with its outer edge $1\frac{1}{2}$ miles from the north point of the bay. Its north end forms, with two detached patches to the north-west of it, a small channel, having 10 to 13 feet, navigable for coasters. Its south end forms with the Alagadas reef a channel, called the Boquero Grande, three-quarters of a mile wide and $6\frac{1}{2}$ fathoms deep. In 1861, at about 100 yards N.E. of the islet, was the wreck of a vessel dry at low water.

The Alagadas are two small separate reefs, each 2 or 3 cables in length, with about 6 feet on them at low water, and they do not always break. They lie S.S.W. of the Itassepanema, leaving between a channel of 2 or 3 cables in breadth and 8 fathoms deep, called Boquero Pequeño. The south extreme of the Alagadas lies E. $\frac{1}{4}$ N. from the church of Santa Cruz, and is the north boundary of the passage to the bay. There are 9 to 11 fathoms water close to these reefs.

SANTA CRUZ BAY, at the northern part of an indentation about 7 miles in length and $1\frac{1}{2}$ miles deep, is protected by the southern reefs of the line which borders the coast from the northward. They leave between them and the shore of Santa Cruz, a clear space of about 2 miles, with 6 fathoms water, sandy bottom in the outer part, and $2\frac{1}{2}$ fathoms in the inner. The coast of the bay about midway is of moderate height, with some woody hills, 98 to 130 feet high, leaving between them a depression in the land, forming the bed of the river, and which is very remarkable from the offing.

The rio Santa Cruz or Juan de Tiba, which, at its entrance, has 6 feet at low water, here falls into the sea; on the north slope of the south hill is the village and church (white with red roof) of Santa Cruz, and at 2 miles north of the latter, on the high land over the north point of entrance, is a conspicuous large tree. The beach of sand which forms the shore of the bay is interrupted by two chains of rocks; one commencing at the foot of the town extends along the coast for 2 miles to the north, and forms, as it were, a quay along the right bank of the river; the second chain is midway between the former and the north point of the bay.

The south part of the indentation is called Cabral bay, where, in its centre, are $4\frac{1}{2}$ fathoms water; a little river of good water falls into it, and

from the east extreme of the bay the Coroa Vermelha extends about three-quarters of a mile to the northward, and uncovers at low tide. On the south part of it, and close to the point, is an islet of red sand. This reef running to the N.N.E. forms a little port sheltered from southerly winds.

The Baixina de la Coroa Vermelha, about 50 yards in extent, with 10 to 13 feet over it at low water, and on which the sea rarely breaks, lies about $1\frac{1}{2}$ miles from the point of the same name, 5 or 6 cables N.N.E. of the extreme of the Coroa Vermelha, and S.W. by S. distant $2\frac{1}{2}$ miles from the Alagadas, the north boundary of the passage to the Santa Cruz, and is marked by a buoy. This shoal forms the southern limit of the principal passage to the bay, and bears S.E. $\frac{1}{2}$ S. from the church of Santa Cruz. In the channel formed by it and the Coroa Vermelha, south of it, there are 6 fathoms water, and 6 to $7\frac{1}{2}$ fathoms all round it.

The sea is never heavy in Santa Cruz bay, even with S.E. winds, but the anchorage in Cabral bay is excellent; vessels should anchor in the former bay when the wind is from North to East.

The latter bay is celebrated in history as the landing place of Pedro Alvarez Cabral, two days after he discovered Brazil by sighting mount Pascal and the coast of the Rio do Frade, on the 24th April 1500. This navigator asserted the safety of this bay by the exclamation: "Samos em porto Seguro!" from which the name has been given to this coast. It is true that a neighbouring place to the southward has usurped the name of Porto Seguro, but its anchorage is open from South to East, and it is less probable that it could be the place which Cabral designated from a storm he experienced, and which could not be from any other quarter than the south, when he must have had very bad anchorage at Porto Seguro, whereas he was perfectly sheltered in Cabral bay.

It is high water off Santa Cruz, full and change, at 3 h. 40 m.

DIRECTIONS.—When bound to Santa Cruz from the northward, a vessel's position can be verified by the Serra Commandatuba; and when from the southward by mount Pascal and the high red cliffs of Porto Seguro; if from the offing the land should be made according to the prevailing winds. If low woody land, the vessel will be to the north of Santa Cruz; but if hills of moderate height and red cliffs to the S.W., she will be to the southward and in sight of Porto Seguro. On sighting the land near the parallel of Santa Cruz, and at 15 to 18 miles distant, a break in the coast will be seen indicating the entrance to Santa Cruz river; the two green slopes of the hills contrast with the red roofs of the church and village.

On the northern hill will be seen the large isolated tree, and in clear weather the two hills, Dos Irmãos, rising 18 or 20 miles W.N.W. of the port. When at a distance of 5 or 6 miles from the church, bring it to

bear W.N.W., and steer for it, which will lead in midway between the Alagadas on the north, and the Baixina de la Coroa Vermelha on the south. When the water shoals to 7 fathoms, and the vessel is within 2 miles of the shore, she may haul up for the anchorage off the mouth of the river ; or steer to the south for that of Cabral bay.

The best berth to the north, is with the point of the reef at the entrance to the river in line with the large tree, bearing W.N.W. distant half a mile, in about 4 fathoms water, muddy bottom and good holding ground. A good berth in Cabral bay will be with Coroa Vermelha point about S. $\frac{1}{2}$ E. distant one mile, in 5 fathoms water, fine muddy sand, or, if convenient, a little farther in.

In working into the bay, a vessel should not stand farther north towards the Alagadas than to bring the church of Santa Cruz to bear W. $\frac{1}{2}$ N., nor to the south towards the Baixina than to bring the church to bear N.W. $\frac{1}{2}$ W. Under favourable circumstance, and if the buoy of the Baixina is in its place, a vessel may pass between it and the extremity of the Coroa Vermelha.

The **RIVER SANTA CRUZ** or **JUAN de TIRA** rises in the chain of the Aymores, and is navigable from its mouth to within 30 miles of its source. The line of rocks which run from the foot of Santa Cruz to the northward, parallel to the shore, forms a natural barrier, and may be considered a continuation of the river's right bank to the entrance. Here, at 2 miles from the village, the river falls into the bay by a channel about 110 yards in breadth and 14 feet deep at high water, with 8 to 10 feet nearer the village.

Small vessels can make good repairs here, although a chop of a sea is sometimes felt when the wind and tide are contrary, but the swell from the offing is broken by the outer reefs. The line of rocks is broken in the middle, affording access for boats. The left bank, at the entrance of the river, is a low shore covered with mangrove trees, and at 100 yards inland are some pools and a rivulet of soft water descending from the neighbouring hills.

The village of Santa Cruz is situated on the site where, in the year 1500, Cabral fixed the cross as a sign of his having taken possession of the continent, which he had discovered, in the name of the king of Portugal. He called it Santa Cruz, and it was about the middle of the sixteenth century that this name was changed for that of Brazil ; but the village preserved its original name, and the bay that of the navigator.

The village of Santa Cruz was founded in 1536 by Pedro de Tourinho; it has been destroyed many times by the Aymores indians, and has never acquired any importance, notwithstanding the convenience of the bays. It stands partly on the summit of a hill about 130 feet above the level of

the sea, and partly on the low coast, in the middle of some groups of cocoa nut trees ; the red roofs of the houses and church are seen several miles from the offing. Its territory comprises about 15 miles of coast between the rio San Antonio, which separates Belmonte, and the rivulet Manguiha to the south of Punta Grande, which separates Porto Seguro. The population of the village is about 500 inhabitants, and that of the district 1,500. Trade is very limited, merely the exportation of a little wood and fruit.

PUNTA INA ROCK.—At about a mile southward of Coroa Vermelha point is another point a little salient, named Punta Ina. At about $1\frac{1}{2}$ miles from the shore, between the two points, is a large detached rock with about 10 feet water on it, on which the sea rarely breaks. There are 9 fathoms water inside it.

ASPECT.—From the low point of Coroa Vermelha, the shore runs to the south for about one mile to Punta Ina, and at $1\frac{1}{2}$ miles farther on to the equally low point of Punta Grande or Muta, when it trends to the west and then S.S.W. to Porto Seguro, which is 9 miles southward of Santa Cruz. In this space two small rivers run into the sea : the rio Manguiha a little west of Punta Grande, and the San Francisco at one mile north of Porto Seguro.

At a mile within Punta Grande, to the middle of the small red cliffs visible from the offing, rises parallel to the shore a chain of hills which increase in height to the southward, presenting some small red cliffs with groups of cocoa nut trees. This chain of hills terminates abruptly at Porto Seguro, where the land trends to the west and forms a marshy valley, bounded at 2 miles to the south by the coast rising like the preceding.

This valley is very apparent from the offing, and is the bed of the rio Buranhen, near the mouth of which is the town of Porto Seguro. At 5 or 6 miles south of the town are the high red cliffs known by the name of the Barreiras de Porto Seguro, and visible from 25 to 30 miles ; they form, with the above valley and mount Pascal, marks which cannot be mistaken. Porto Seguro may also be known by the church of Nossa Senhora da Peña or Matriz, situated on the height to the north above the town ; it is white, and very conspicuous when the sun shines on it, especially in the morning.

The Malembar, a large isolated tree, stands on the crest of the coast at one mile north of the church, and is clearly defined. There is also another church on a hill south of the valley, named Nossa Senhora da Judea, which is rather less conspicuous than that of Porto Seguro ; it is well visible when bearing S.W. or West, but is masked by the trees in coming from the south.

PORTO SEGURO REEFS.—From Cabral bay the low shore southward to Porto Seguro is skirted by extensive reefs. The Porto Seguro reef lies between the place of the same name and Grande point at $4\frac{1}{2}$ miles north of it, with its outer edge upwards of 4 miles from the coast, some parts of which uncover or break continually. The outer part of the reef is named Baixo da Fora; the south-west part, near the port, consisting of some detached patches, Sororoca; and the south part of the same reef, which breaks, Itassepanema. There is a narrow winding channel carrying 3 fathoms water, between the outer and the coast reefs, at the distance from a half to three-quarters of a mile from the shore, leading to Porto Seguro. It is only practicable for small steamboats with very good pilots.

The north edge of the outer reef is a little southward of the parallel of Punta Grande. The church of Santa Cruz bearing N.N.W. leads close to its north-east edge, which is a little outside the line of that town and the Cora Vermelha. The southern edge is near the parallel of the Malembar tree, north of Porto Seguro church. The south-east edge is in line with mount Pascal and the north end of the red cliffs of Porto Seguro.

When the weather is clear the best mark for passing eastward of the reef is mount Pascal open south of the red cliffs of Porto Seguro, which leads 2 miles to the eastward. At night they should not be approached nearer than 3 miles in a less depth than 15 fathoms. There are 7 or 8 fathoms water, sand and coral, close to these dangers.

PORTO SEGURO, at the entrance to the rio Buranhen, is fronted by a ledge of rocks running parallel to the shore for the distance of about half a mile, and forms, at the north end of it, a channel into the river about 110 yards in breadth, and 14 feet deep at high water, and 6 feet at low water; at one mile above the town is about 12 feet at high water. The left bank is a broad sandy beach, at the end of which is the town at the foot of the hills. The ancient name of the river was Cachoeira, because in its course are a number of cataracts; its present name is that of a tree which is common on its banks.

The town, which owes its name to the shelter the anchorage is supposed to have given during twenty-four hours to the vessels of Alvarez Cabral, was founded in 1534, for felling and collecting Brazil wood. It is formed of three adjoining villages; Pontinha, Marcos, and Pacata, and stands on the sandy banks of the river, but chiefly behind the elevated land north of it, containing about 400 houses and 3,000 inhabitants, indians or negroes. The outer anchorage is protected on the north by the reefs which, from the mouth of the river, trend northward and nearly join those of Porto Seguro. To the southward the shore is clear of danger.

A large number of fishing vessels belonging to the port are employed.

in the vicinity of the Abrolhos isles ; they keep the sea for a month or six weeks until their cargoes are completed. The principal fish is of the salmon species, which is salted for the Bahia market.

DIRECTIONS.—Vessels bound to Porto Seguro from the northward, should steer along the coast at a distance of 8 or 10 miles in 16 to 20 fathoms water ; the Serra de Commandatuba and the red-roofed houses of Santa Cruz will be seen, and, in advancing to the southward, the white church of Porto Seguro at a distance of 15 miles ; soon after, if the weather is clear, mount Pascal will appear in the horizon like an isolated round hill, and in the same direction the red cliffs of Porto Seguro.

When these latter objects are seen, mount Pascal should be brought open south of the cliffs, and well open if the wind and swell is towards the shore. When the church of Porto Seguro bears northward of W. by N., steer for it to the anchorage at half a mile eastward of the extremity of the rocks, which form the entrance to the port, with the church bearing W.N.W., and the red cliffs of Porto Seguro S.S.W., in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water, sand and mud, good holding ground.

If from the offing without having made the land either north or south, steer on about the parallel of $16^{\circ} 25'$, and when at about 30 miles from the coast, the land will appear broken by the deep valley of the rio Buranhen, and on nearing it, the former objects will be seen, when a vessel can proceed as before. If from the south or south-east, mount Pascal and the red cliffs will leave no doubt as to the vessel's position.

The anchorage is well sheltered with the winds from north to east, but it is open to the south and south-east, and in strong winds exposed to a heavy sea from that quarter. A vessel would be in danger if surprised by a gale from this latter direction, and should be prepared to leave should the wind freshen. But the very bad weather on this coast is rare, and during the worse season, that of June, July, and August, there is little to fear but the squalls from the S.W., which are of short duration, and seldom sufficiently strong to be dangerous when the seaman is on his guard.

The COAST from Porto Seguro runs to the southward for $19\frac{1}{2}$ miles to Joacema or Insuacome, a white cliffy point. At nearly 3 miles southward of Porto Seguro church is that of Nossa Senhora da Judea, which is conspicuous, and forms a good mark ; a little north of it commences a series of hills, occasionally wooded, and at $1\frac{1}{2}$ miles beyond it is the commencement of the Barreiras de Porto Seguro, steep red cliffs 130 to 165 feet high, and which are visible some distance seaward, and extend to the southward for 3 miles, where they are broken by a valley and the rio Trancoso falling into the sea.

At 7 miles farther on is the Barra do Frade, and about $4\frac{1}{2}$ miles beyond it is Cape Joacema. In this latter space the coast is broken and uneven,

presenting alternately wooded ravines and small white cliffs, which become more white as the cape is approached.

RIOS TRANCOSO and FRADE.—The rio Trancoso runs into the sea in lat. $16^{\circ} 34'$ through a valley about $1\frac{1}{2}$ miles in breadth separating the northern from the southern portion of the red cliffs. A village of the same name is situated on the hill on the south side of the valley, surrounded by cocoa nut trees, and visible from the offing. This village is chief of a district containing 1,500 inhabitants, indians and negroes, and was founded in 1586. At the commencement of the Barreiras the rivulet Pitanga runs into the sea.

To the south of the Trancoso are some red cliffs about 2 miles in extent, when the coast becomes lower, forming another valley, through which, along the hills to the south, the rio Frade runs into the sea at 7 miles from the Trancoso; it is navigable only for boats, and its bar is dangerous. Itaquena point, at $2\frac{1}{2}$ miles north of the entrance, is a little salient, low, and wooded, with a few houses on it. A little river discharges at the point. The aspect of the coast is here pleasing and picturesque. The south point of entrance is bold, and projects a mile seaward; the land southward runs S.S.W. for 4 miles to the cape.

CAPE JOACEMA or INSUACOME is remarkable by two or three white scarp'd cliffs, which form as it were steps to the south. The white cliffs are the first of the kind in coming from the north, and mount Pascal bearing W.S.W. $\frac{1}{8}$ W., distant 20 miles from the cape, renders it easily known. The coast north of the cape may be approached to the distance of a mile in 9 to 11 fathoms water.

The low broken point of Corumbao lies S. by E. $\frac{1}{4}$ E. distant 7 miles from that of Joacema; the shore between forming a bay, about 2 miles deep. In the southern part of the bay the rio Corumbao disembogues, and there are some houses south-east of it. The point is surrounded by the extensive reefs named Itacolomis, which extend eastward for a distance of 5 miles.

It is high water in the vicinity of Cape Joacema, at full and change, at 3 h. 30 m.

JOACEMA and PITIASSU REEFS.—The Joacema reef, about a cable in diameter, has about 3 feet over it at low water; it is composed of sand and coral, and lies at half a mile south of the cape, with 10 feet water between, 13 to 16 feet between the bank and coast, $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms in the channel it forms with the Pitiassu, at about three-quarters of a mile south of it, and nearly 4 fathoms at 2 cables eastward of it.

The Pitiassu reef is larger than the former, being half a mile in diameter, with about 2 feet on it at low water; it lies 2 miles S.S.E. of the cape,

and $1\frac{1}{4}$ miles E.S.E. of Juricuara point. Between it and the coast there are $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms water, sand and mud; and in all other directions, at the distance of a cable, 5 or $5\frac{1}{2}$ fathoms.

ANCHORAGE.—Within these reefs the shore is clear of danger, and there is good anchorage for small vessels, and better than that of Porto Seguro; it is well sheltered from all winds, and protected against the swell from the South and S.E. by the Itacolomis reefs, and from the East and N.E. by the above reefs and coast. The access is easy, and also communication with the shore; landing may be made in the creek inside the cape, or in the river, at favourable times of the tide. On the shore west of the cape, at about a hundred paces from the sea, is a small lake of soft water fed by a rivulet which descends from the neighbouring hillocks.

The coast from the cape is formed of small hills of less height than the land to the north; and at the distance of 3 miles is the mouth of the rio Cramimuan, with Juricuari point, remarkable by its red colour, between. From the Cramimuan the shore is low, woody, and trends to the S.S.E. for 5 miles to Corumbao point; in this part of the bay, although sheltered from the east by the north part of the Itacolomis, are several reefs, but their positions have not yet been ascertained.

RIO CRAMIMUAN.—The entrance to this river, 6 feet deep at high water, is 3 miles southward of cape Joacema, and is known by the hills north of it, Juricurari point, and by some large groups of cocoa-nut trees sheltering a village at a mile from the shore, on the right bank of the river.

DIRECTIONS.—In fine weather a vessel will find temporary anchorage in about 5 or $5\frac{1}{2}$ fathoms water, mud and good holding ground, at three-quarters of a mile S.E. of Cape Joacema, and about the same distance eastward of the Pitiassu reef; but in a fresh breeze a vessel should anchor inside the Pitiassu, or between it and the coast, passing in either north or south of the reef. When the tide is low, the breakers indicate sufficiently the position of the rocks, but at high water and a smooth sea the following route should be taken:—

Bring Cape Joacema to bear about N.W., or W.N.W., and when at a distance of 2 miles from it the isolated red cliffs of Juricuari point will bear about West, and the entrance to the rio Cramimuan, remarkable by the groups of cocoa nut at the commencement of the low land, S.W.; then steer westward on the parallel of Juricuari point, in mid-channel, between the Pitiassu and the Joacema reef north of it, and anchor in $4\frac{1}{2}$ or 5 fathoms water, mud, at about half a mile from the shore, with the point N.N.W. or N.W. by N., distant $1\frac{1}{4}$ miles.

In proceeding in south of the Pitiassu, steer on the parallel of the bar of the Cramimuan, and anchor as before.

MOUNT PASCOAL, a remarkable peak 1,760 feet high, forms part of a group of hills lying nearly in a north and south direction, and so named from its being the day of Paschal when Pedro Alvarez Cabral first saw it in the year 1500, when he discovered Brazil. The mount rises about $18\frac{1}{2}$ miles inland, nearly in the parallel of Corumbao point, and about midway between Porto Seguro and Prado.

When seen from the north-east or eastward, it is like an isolated round hill, slightly conical, and higher than the surrounding land; but from the south-east it appears connected by many other hills less elevated, and one remarkable peak in the form of a large cylinder or tower on the summit of the mountain. This is Juan de Leão peak, which rises 12 miles S.W. by S. of mount Pascal, and appears a little higher than that mountain. These are the only summits in sight from the offing that are seen between the Serras de Commandatuba and the high land of Espirito Santo. Mount Pascal may be seen at a great distance, and from its height and isolation is a most useful land mark for this part of the coast.

The ITACOLOMI,* a cluster of rocks, several of which are uncovered at low water, rises from a sand-bank which extends north and south for a distance of 7 miles, with its outer edge 5 miles from Corumbao point. In the middle of the bank the numerous patches of coral are much broken, and uncover at low water; but towards the edge it is less broken, becomes covered, and the water deepens from the centre. The reef is steep-to, rising perpendicular from a uniform bottom of 8 to 12 fathoms deep, and about the same depth is found at 3 miles from it; the soundings within this distance will not therefore indicate an approach to these dangers. The centre of the reef is on the parallel of mount Pascal; the north end of the bank lies with the mount bearing W. $\frac{1}{2}$ S., the south end with the mount W. by N. $\frac{1}{4}$ N., and the north-east extreme with the white cliffs of Cape Joacema N.W. $\frac{1}{2}$ W.

There is a narrow channel, carrying 16 feet at low water, between the reef and Corumbao point. There are 12 fathoms water about three-quarters of a mile from the outer edge of the bank, and the same depth will be found about 5 miles south-east of it. About the middle of the edge there are 5 and 8 fathoms close to. By not going into a less depth than 17 fathoms, a vessel will be more than 3 miles from the reef, and during night it will be prudent not to go nearer than 20 or 22 fathoms.

ITACOLOMI CHANNEL and CORUMBÃO POINT.—Corumbao point is bare, very low, covered for several cables at high water, and forms the delta of several small rivers. It is situated within the middle of the reef,

* Itacolomi, from *ita* (stone), and *columi* (little), a term applied to many rocks which appear above water, and to round hills on the coast.

and separated from its western edge by a channel of about 110 yards in breadth, and 3 to $3\frac{1}{4}$ fathoms deep; but it is tortuous, unfit for general navigation, and only practicable for small steamers with very good pilots. The most favourable time for using the channel is at low water, when the reefs are uncovered. Small steamers bound to the northward with a strong breeze find smooth water in this channel.

From Corumbao point the shore runs to the S.W., and the edge of the reef to the S.S.E., forming a tolerably large angular space, where there is anchorage in about 5 fathoms water, sand and mud, good holding ground, and sheltered from all winds except the south.

THE COAST from Corumbao point trends a little westward and then south to Prado and Alcabaça. In the first part between Corumbao point and Comoxatiba, a distance of 15 miles, the coast is formed alternately of sandy beaches and four cliffs at equal distances, beginning from the north. The Barreiras de Cahy, at 7 miles southward of the point, are remarkable large white cliffs, and serve as a mark, conjointly with a large tree showing above the woody coast, for the Itacolomi channel.

The tree known by the name of Meruim stands near the shore midway between Corumboa and Matto Grosso point, at 2 miles southward of the Barreiras de Cahy, and which is formed of some remarkable reddish cliffs tolerably elevated. At about 2 miles southward of Matto Grosso point is the Barreira de Tahua, a reddish cliff, but smaller than the former. The Barreiras d'Imbossuaba are also red cliffs, in lat. $17^{\circ} 4'$, in a small bay; they are visible from the S.E., but masked north of their parallel when bearing W.S.W. or S.W. Some small rivers of no importance run into the sea between the different cliffs.

A chain of detached reefs extend all along this coast at a distance of 2 or 3 miles, and nearly on the meridian of Corumbao point. They form between them channels, and with the coast some small ports, with room for moderate size vessels.* The most southern of these reefs is named Patachos, which uncovers at low water; there are two large banks of coral extending from the coast, steep-to, with $5\frac{1}{2}$ fathoms water close to them, and 7 or 8 fathoms at the distance of 3 miles. At high water these reefs are covered, and the coast should not be approached in a less depth than 8 fathoms.

PORT COMOXATIBA.—A chain of reefs bordering the coast within the Patachos, having an opening near the point, forms at Comoxatiba a small basin, half a mile in extent and 16 to 20 feet deep, and where a dozen coasters may find good shelter and smooth water even with a fresh breeze from the N.E. When the water is high it passes over the reefs causing a little swell. A pleasant sandy beach, through which some small rivulets

* *Annales Hydrographiques*, 3rd part, 1863.

run into the sea, forms the head of the port, and a little hamlet and some cocoa nut trees stand on the south end of the beach. On the highest hill, in the midst of thick vegetation, are the ruins of an ancient village said to be Columbian.

Outside the port, along the reef, are $5\frac{1}{2}$ fathoms water, sand and mud; $6\frac{1}{2}$ and 7 fathoms at 2 miles eastward; 11 fathoms, mud, at 4 miles; and 16 fathoms, sand and mud, at 9 miles: but farther off at a distance of 25 miles on the same parallel are only 15 and 16 fathoms, over sand, sand and gravel, or madrepores and broken shells.

TIDES.—It is high water in Port Comoxatiba, at full and change, at 3 h. 30 m.; and the rise is from 5 to 6 feet.

POINT COMOXATIBA is easily known from the offing, as it is situated 2 miles to the north of the large red cliffs of Prado. This point is covered with vegetation, which masks the hamlet near the shore. At a little distance from the shore, on a hill, are the ruins of an old church in the midst of trees.

A little fishing village composed of about a dozen houses, named Dos Irmãos, stands 3 miles southward of Comoxatiba, in a ravine at the commencement of the cliffs, and is approached through a break in the recife.

BARREIRAS do PRADO.—The coast from Comoxatiba point trends a little westerly, and then runs nearly south, presenting a series of very remarkable uninterrupted red cliffs from 195 to 265 feet high, and 9 miles in length. These cliffs begin near the hamlet of Dos Irmãos and extend to $2\frac{1}{2}$ miles north of the village of Prado, from which they take their name, and being visible some distance they are the best mark for vessels navigating near the coast.

An uninterrupted chain of rocks extend all along these cliffs from Comoxatiba to their southern extremity, where they terminate in front of the south point of the cliffs in a large patch of coral, named Calções Fora, in lat. $17^{\circ} 17'$. These reefs are about half a mile from the shore. At 3 miles from the Barreiras of Prado there are $6\frac{1}{2}$ to 8 fathoms water, sand and mud; at 5 miles 11 fathoms, sand and gravel; at 20 miles 22 fathoms, sand and broken coral.

No trace of habitation is seen along these cliffs; and the only remarkable break is that where the rio Japara runs into the sea, at about 3 miles from their commencement. This is the last elevated coast land seen coming from the north, as from here to Espirito Santo, an extent of about 180 miles, the coast is nothing more than a low beach with here and there some scanty vegetation, and visible from 8 to 12 miles.

In front of this low land the bottom rises suddenly, and forms a vast plateau of about 150 miles in length and 120 in breadth, which is the base of the Abrolhos islets and reefs. This plateau, very irregularly broken,

risers abruptly like a wall from a depth of 40 to 275 fathoms. The nature of these reefs is a species of granite, and not coral as is generally supposed.

PRADO.—This town, built before 1764, now contains about 1,000 inhabitants, and is the most important between this and Porto Seguro. It stands at one mile north of the mouth of the rio Jucuruçu, on a tongue of land formed by the river making an elbow before running into the sea. The surrounding country is fertile, and produces large quantities of manioc; besides which the town exports wood and salt fish, the groupas taken in the neighbourhood of the Abrolhos isles, but few other supplies can be procured.

The bar of the Jucuruçu is very dangerous even in fine weather. In the river at 6 miles from the town there are from 6 to 13 feet; and it is navigable for boats to 18 miles from the sea, where it is divided into two small branches, which are named the Rio do Norte and the Rio do Sul.

DIRECTIONS.—Vessels bound to Prado from the East or N.E. should avoid the Timbebas reef by making the Barreiras de Prado in about lat. $17^{\circ} 15'$, and if the weather is clear mount Pascal will be seen at a distance of 45 miles, at 30 miles from the coast, in 17 to 22 fathoms water, coral bottom. The cliffs will be seen to rise gradually at a distance of 15 miles, in 15 fathoms, sand and shells; a little after the coast appears as a line of trees, the first group seen will be the large trees on the south side of the entrance to the rio Jucuruçu. When near, this group appears but little higher than the others, but seen from a distance, they are more marked.

When the village, and white church, which, in contrast with the green verdure, is seen, steer so as to pass north or south of the Prado reef, but to the north is preferable, and anchor in about 4 fathoms water, sand and mud, at one mile from the bar, with the village to the N.W. distant 2 miles. This anchorage is sheltered from the sea by the Prado and Guaratibas reefs. The flood tide sets to the southward, and the ebb to the northward. The currents in the offing are tolerably strong, but depend much on the direction and force of the winds.

The COAST, from the town of Prado, runs to the south for about 5 miles, to the low point of Guaratibas, then for 6 miles farther to the bar of Alcobaça, where it trends to the south-east for 10 miles to Balea point. On all this extent it has the same aspect, and visible at a distance of about 12 miles; the low beach is crowned with a line of uniform vegetation, and some trees a little higher than others, serving as marks; of which the three following are the most conspicuous:—

The large group of trees at the bar of Prado; they appear above the horizon at 13 or 14 miles distant, but their height appears to diminish as the coast is approached; they are of great utility when navigating near

the Timbebas. The Fincudo is a large round tree, rising above those in its vicinity, and very remarkable; it is near the shore, at 2 miles south of the bar of Alcobaca, for which place it serves as a mark, and is seen first in the horizon above the low coast.

The tree of Caravellas, on the most elevated land, serves to guide vessels outside the banks of Caravellas; it is situated on south side of the river of the same name, near the village, and is of great use to the fishermen.

ALCOBACA.—The little village of Alcobaca, like that of Prado, stands between the shore and the left bank of the rio Itanhen, which runs into the sea at 2 miles south of the village. When seen from the offing it appears larger than Prado, but it contains only between 700 and 800 inhabitants, the greater part indians. There is less commerce here than at Prado, although the river is easier of access, which can be entered during fine weather and favourable tide by coasters of 6 feet draught. Pilots are always to be obtained.

The rio Itanhen runs from the chain of the Aymores, and is navigable for some miles. At one mile eastward of Alcobaca there are $5\frac{1}{2}$ fathoms water, sand and mud; and at 5 miles 8 and 9 fathoms, mud. At about a mile to the N.N.E. of the village is a small patch of rocks, but its exact position is doubtful. From the bar of Alcobaca the coast, forming a bay to the southward, is bordered by an extensive sand-bank. At 3 miles southward of the Fincudo tree is the Barra Velha, the mouth of a little river, with a small fishing village.

BALZA POINT is low, woody, the most salient on all this part of the coast, and forms the north point of entrance to the Rio das Caravellas. On its extremity are two houses with red roofs, and a mast rising from the midst of the verdure, visible from the offing. An extensive sand-bank fronts the point, partly dry at low water, leaving between it and the shore a small channel carrying 6 to 8 feet water.

PRADO, GUARATIBAS, and TIMBEBAS REEFS.—At about 3 miles E. by S. $\frac{1}{2}$ S. from the town of Prado is the north end of a dangerous reef, 110 yards in extent, of the same name; it uncovers, with 6 fathoms water, sand and mud, at about half a mile outside it, and $2\frac{1}{4}$ fathoms at a mile northward of it. The depth between it and the shore is $1\frac{1}{2}$ to 4 fathoms.

At 3 miles S.S.E. of the above is the Guaratibas reef, which also uncovers, with its outer edge nearly $3\frac{1}{2}$ miles E.N.E. from the point of the same name. It is a mile long north and south, a cable in breadth, and separated into two parts by a narrow channel having $4\frac{1}{4}$ fathoms water. There is a narrow passage for small coasters inside it, with 10 feet water between some sand banks; and $5\frac{1}{2}$ fathoms, sand and mud, between it and the Prado reef.

At $6\frac{1}{2}$ miles S.E. by E. $\frac{1}{2}$ E. from the northern part of the latter reef, and 9 miles from the shore, is the north-west end of the Timbebas bank and reef, with 8 and 10 fathoms water between them. From thence the reef extends to the south-east for $2\frac{1}{2}$ or 3 miles, with its outer edge 12 miles from the shore, and 9 fathoms water a mile outside it. The Timbebas reef, being so far off the coast, is the most dangerous of the group, as, when at one or 2 miles from it, the land appears as a uniform line with nothing to mark it. If however the weather is clear mount Pascal will be seen bearing about N.W. by N. The centre of the reef is 12 miles E.N.E. from the village of Alcobaça, 13 miles E.S.E. from the bar of Prado, and S.S.E. $\frac{3}{4}$ E. from mount Pascal. It is somewhat circular, and from $2\frac{1}{2}$ to 3 miles in diameter. In the centre the coral uncovers, but its edges are always covered.

The lead is of little use in approaching this bank, as the depths are nearly the same within the limits of 2 and 6 or 8 miles from it. There are however some patches of coral, with $5\frac{1}{2}$ and $6\frac{1}{2}$ fathoms water on them, at 2 miles distant. When the winds are fresh from the offing the current sets strong to west or south-west. Between the two latter banks there are from 7 to 11 fathoms water.

PARCEL **das PAREDES** are extensive banks and reefs lying westward of the Abrolhos islets and bordering the coast for a distance of nearly 30 miles. They extend from a distance of 22 miles north of the parallel of the Abrolhos isles to that of about 3 miles south of them; large portions of the reefs are awash or above water, with the outer edge of the main group at the northern part 12 miles from Ponta da Balea, and at its southern part 20 miles from the shore, and they are so steep-to as to have acquired the name of Paredes or walls. They are divided into two divisions; the main group lies to the north-west of the Abrolhos isles and extend over a space north and south for 19 miles, the north extreme being $7\frac{1}{2}$ miles southward of the Timbebas reef with a clear channel between them, and depths varying from $7\frac{1}{2}$ to 12 fathoms.

At 7 miles westward of the south edge of the main group, is the north-east reef of the southern cluster, named Sebastião Gomez, which uncovers at low tide. The channel between carries from 5 to 10 fathoms water. At $3\frac{1}{2}$ miles south-west of the Sebastião Gomez is the Coroa Vermelha, an islet of reddish sand, 3 feet above water, and about a third of a mile in diameter. A reef of coral extends 2 miles north of the islet, and uncovers. There is a passage between this reef and that of Sebastião having from 6 to 9 fathoms water. The islet has some small trees or brushwood on it, which is seen 6 or 7 miles. At 2 miles S.W. from the islet and 7 miles from the mouth of the rio Perohipe is the south-west part of the whole group, named the Viçosa reef, which uncovers at low water, and is about 4 miles in length in a N.W. and S.E. direction. At 14 miles

E.S.E. from the Coroa Vermelha, 16 miles W. $\frac{3}{4}$ S. from the Abrolhos lighthouse, and on the meridian of the centre of the main group of the Paredes, is the Poppa Verde bank with $2\frac{3}{4}$ fathoms water on it. Within and between the reefs there are navigable channels for small coasters.

The **ABROLHOS**, or islets of Santa Barbara, are four in number, exclusive of rocks, the highest of the latter lies $1\frac{1}{4}$ cables northward of the largest islet; the whole occupying a space of about $1\frac{1}{4}$ miles, at 30 miles from the coast. The two northernmost islets, lying nearly east and west, are the largest and highest; the westernmost is 130 feet, and the easternmost about 150 feet high. The islets are formed of a whitish rock, which decomposes in the air, but hardens in the sea. The only vegetation on them are some rushes, cactus, wild purslain, and on one of the rocks is a little tuft of bushes. Innumerable birds dwell on these islets, and cover them with their nests and eggs. Turtle at times have been found.

Sea salt crystallized is found in several places, and a small quantity of fresh water filters through the rocks at the north point of the largest islet. The northernmost, or Santa Barbara islet, is free from danger, with the exception of the west end, where a reef extends to the north-west for a distance of about $1\frac{1}{2}$ cables. The three smaller islets are each bordered with reefs, but they do not extend off more than $1\frac{1}{4}$ cables. The two westernmost islets are connected by a reef; and there is a narrow channel having $2\frac{3}{4}$ fathoms water between them and the northernmost islet.

At the distance of $6\frac{1}{2}$ cables eastward of the south islet is the western edge of a bank having only 20 feet water over it; and northward of the bank, about the same distance south-east from the northern islet, is another patch with 23 feet over it. With these exceptions the water between the islets is deep, and a vessel may if necessary pass at a distance of a third of a mile on either side or through between them. They lie $1\frac{1}{4}$ miles from the western side of a coral bank with irregular depths of the same name, about one-third from its northern part.

The **BANK**, with an average depth of about 10 fathoms, and in places only 3 to 10 feet water on it, uncovers and breaks towards the centre. It extends north and south, 9 miles in length, and 2 miles in breadth, with its eastern edge $3\frac{1}{2}$ to 4 miles from the meridian of the lighthouse. At about a mile from the south-west edge of the bank is a shoal spot with $5\frac{1}{2}$ fathoms water on it; and at $6\frac{1}{2}$ miles from the southern edge, and $12\frac{1}{4}$ miles from the lighthouse, is another shoal spot with $5\frac{1}{2}$ fathoms on it. Between this latter shoal and the bank there are from 22 to 9 fathoms, and at 2 miles from the eastern edge of the bank, or 6 miles eastward of the meridian of the lighthouse, there are from $12\frac{1}{2}$ to 19 fathoms water.

In the vicinity of these islets fishing is carried on by the inhabitants

of the neighbouring coast. Those of Porto Seguro send about 50 vessels every year during the northern monsoon ; they take cargoes of fish called groupas, which are dried, and form the ordinary food for the people. The vessels generally remain out six weeks.

LIGHT.—On the eastern part of Santa Barbara, the largest and northernmost islet, is an iron circular tower 50 feet high, surrounded by a dwelling, which exhibits at the height of 189 feet above the mean level of the sea, a *revolving* white light, attaining its greatest brilliancy every *minute*, and should be seen in clear weather from a distance of 17 miles.

ANCHORAGE.—There is anchorage with northerly winds in $8\frac{1}{2}$ fathoms water, sand and shells, about midway between the largest and southernmost islets, with the lighthouse bearing N.E. $\frac{2}{3}$ N. distant half a mile ; and with southerly winds to the northward of the islets in $7\frac{1}{2}$ fathoms, fine sand and shells, with the lighthouse S.S.E. $\frac{1}{4}$ E. distant rather more than half a mile, and about a quarter of a mile from the shore. A vessel may steer in on either side of the south islet by giving the rocks a berth of a quarter of a mile ; and may pass out to the northward, eastward of the lighthouse at the same distance from the point in $7\frac{1}{2}$ and 8 fathoms water.

TIDES.—It is high water at the Abrolhos isles, and at Caravellas, on the coast at about 3h. 20m. ; and the rise is from $6\frac{1}{2}$ to 7 feet. The tides are pretty regular, but influenced by the strength and direction of the wind. The current runs from one to $1\frac{1}{2}$ knots ; in the narrow channels of the Paredes it attains 3 knots and follows the direction of the channels.

The ABROLHOS CHANNEL is bounded on the east by the islets and bank of the same name, and on the west by the extensive banks and reefs of the Parcel das Paredes. The channel is 10 miles wide and may be taken with safety in clear weather, for, with the exception of two spots having $6\frac{1}{2}$ and $7\frac{1}{2}$ fathoms water over them, the general depths are from 9 to 13 fathoms. As the banks are, however, steep-to, little or no dependence can be placed on the lead, yet as a rule the depth of water rather increases on approaching the reefs, when a white chalky mud will be found.

Intending to pass through the Abrolhos channel from the northward after ascertaining the vessel's position, the islets should not be approached nearer than 7 or 8 miles. But when the light is seen, bring it to bear S. by E. and steer for it. When at the distance of about 6 miles steer S.W. $\frac{1}{2}$ S. for 6 miles in 10 to 12 fathoms water, passing about 4 miles westward of the light until it bears E. by S., then steer S.S.W., which will carry a vessel nearly midway between the Abrolhos and Poppa Verde banks, clear of all dangers.

From the southward, keep the light on a N.E. bearing, and when at the distance of 6 or 7 miles from it, steer North until it bears E. by S.,

when the depth will be 10 or 11 fathoms, and the south-east edge of the Parcel das Paredes 7 miles distant ; then steer N.N.E. or N.E. by N. clear of all dangers ; and when the light bears South a vessel will be 10 miles from the outer edge of the Paredes.

OUTLYING BANKS.—There are several outlying banks off this part of the coast of Brazil. The south end of the northernmost is on the parallel of 17° S. and in long. $36^{\circ} 10'$ W., from thence it runs to the northward for 14 miles, having a breadth of about 2 miles, with 31 to 35 fathoms water over it. The Hotspur bank extends 14 miles N.W. and S.E. and 10 miles in a N.E. and S.W. direction with 25 to 30 fathoms water on it. The north-west extreme of this bank is in lat. $17^{\circ} 51' 30''$ S., long. $36^{\circ} 8'$ W. ; close to the westward of it the water deepens to more than 200 fathoms. No ripple or discolouration marks its position.

The Victoria bank lies between the meridians of $37^{\circ} 10'$ and $38^{\circ} 18'$ W., and the parallels of $20^{\circ} 30'$ and $20^{\circ} 55'$ S., having from 40 to 19 fathoms water on it ; this latter depth is near the north-east part of the bank in long. $37^{\circ} 20'$ W., and close to the north of it the depth is more than 100 fathoms. The Pilot bank lies in a N.E. and S.W. direction between the parallels of $21^{\circ} 40'$ and $21^{\circ} 56'$ S., with its south-west end about 55 miles from Cape St. Thomé. This bank has from 9 to 35 fathoms water over it, with upwards of 75 fathoms water outside it, and a depth of more than 160 fathoms between it and the bank surrounding Cape St. Thomé. All these banks have a hard coralline crust, and are steep-to.*

RIVER CARAVELLAS.—The mouth of this river, fronted by sand banks and reefs, which extend off 4 miles, is about 22 miles southward of the town of Prado at the entrance to the Jucuruçu. It is about half a mile wide, with an *armação* and village on the north side of entrance, and admits vessels of 12 feet draught, but the water inside the bar deepens to 6 fathoms. At about 6 miles from the entrance one branch of the river trends to the south-west and communicates with the Perohipe near Villa Viçosa. The town of Caravellas stands on rising ground on the north side of the river, 4 miles from the entrance, and carries on a large trade in farinha, coffee, and fish ; the former two are extensively cultivated in the district.

Many small vessels belong to the port and are built here as well as for Porto Seguro: The population is about 5,000.

The COAST.—From the mouth of the Caravellas the low shore runs to the south-west for 14 miles to that of the little river Perohipe. Villa Viçosa stands on the north bank of the latter river at $4\frac{1}{2}$ miles from the bar. From the mouth of the Perohipe the coast continues to the south-west for 15 miles to the bar of the river Mucury, and village of San José de Porto

* See note at p. 115.

Alegre. The river Mercury is navigable for about 50 miles from its mouth. The coast then runs to the south-west for 8 miles, and then trends to the southward for 24 miles to the mouth of the river San Mateo. It is all along level, and presents a uniform line of vegetation. The Barreiras Velha, 9 miles southward of the Mercury, are reddish cliffs about 100 feet high, and remarkable by their isolation.

La Punta Lençol, at 2 miles southward of them, is so called from some peculiar white spots seen a few miles in the offing, and which have the appearance of groups of houses or white linen spread on this coast. From Punta Lençol to the rio Doce, at 67 miles farther south, the land is a very low sandy plain with scanty vegetation; in many places the coast is composed of yellow sandy hills separating the sea from the marshes and lagoons, and which extend to the foot of the mountains at 25 or 30 miles in the interior. At $2\frac{1}{2}$ miles south of San Mateo are some large white sand downs. This latter part of the coast is visible at a distance of 8 or 10 miles; it is clear of danger, and at 3 miles off there are 6 and $6\frac{1}{2}$ fathoms water.

From the rio Doce the coast trends to the south-west and changes its aspect; it becomes more elevated and frequently interspersed with small red cliffs, bordered by a few reefs which extend off about a mile. The high mountains of the Aymores rise from the low land in the interior, and from the south-west is seen Mount Mestre Alvaro. Between the rio Doce and Espirito Santo bay, the Sahy, Santa Cruz, Preto, Reis Magos, and Carahipe rivers disembogue, the latter on the parallel of Mount Mestre Alvaro.

RIO SAN MATEO.—A small island with a village on it fronts the entrance to San Mateo; inside it are the mouths of four different streams. The entrance has 6 feet at high water ordinary tides and 9 feet at springs, but is dangerous, with breakers on either side, within which may be seen among the trees the masts of small vessels. The town of the same name is 12 miles from the entrance. At some distance in the interior and a little southward of the bar there are three small downs, the middle one being the highest, but when seen from the eastward they appear in one.

RIO DOCE.—The bar of the rio Seca is about 30 miles southward of that of San Mateo, and forms a small opening between the trees. The bar of the rio Doce lies 30 miles southward of the rio Seca, and carries $13\frac{1}{2}$ feet at high water springs, and 9 feet at neaps; it appears like a large open space between the trees with which the coast is covered. Inside the bar is a spacious basin. A bank of red sand extends from each point, the breakers reaching out 3 miles, and the entrance is besides obstructed by a bank above water. The north point of entrance extends out a little farther than the other and has a large house on it.

The bar of the Rio dos Reis Magos southward of the Doce has $7\frac{1}{2}$ feet at high water springs, but is dangerous.

MOUNT MORENO.—The base of this mount forms the south point of entrance to the bay and river of Espirito. The mount is conical, partly wooded, devoid of verdure on the east side, about 690 feet high and may be seen in clear weather from a distance of 30 miles. At rather more than six-tenths of a mile S.W. by W. $\frac{1}{2}$ W. from it is the morro of Nossa Senhora da Penha, a rocky hill, with the remains of a church on its summit, which may be seen at a distance of 15 miles.

The elevation of mount Mestre Alvaro, over rather low land, about 11 miles north, its form and isolated position renders it equally remarkable; it succeeds the low lands of the north, and nearly terminates the high lands of the south, so as to leave no doubt when it is in sight as to a vessel's position.

ESPIRITO SANTO BAY.—The entrance to this bay is 3 miles wide and formed between Tubaraõ point on the north-east and Moreno point on the south-west. The bay is about 3 miles deep, and in the southern part, in front of the mouth of the river Santa Maria are two islands with several small islets or rocks. From Tubaraõ point, which is low and wooded, a reef of rocks extend to the south-east for half a mile, with 6 fathoms water at $1\frac{1}{4}$ cables southward of them. At rather more than a cable's length north-east of Moreno point is the Balea rock uncovered, with sunken rocks around it; and at about half a mile eastward of the point is the Cavallo reef.

A dangerous sunken reef lies in the fairway of the entrance to the river, with the inner part of Tubaraõ point bearing N. by E. $\frac{1}{2}$ E.; Balea rock in line with the south point of entrance to the river or that about three-quarters of a mile next West of the battery; and the convent on the hill north of the town of Victoria, midway over the southernmost island. There are 9 fathoms water close to the rock, and with a smooth sea it is seldom seen, but with strong breezes blowing into the bay the sea breaks on it. At high-water springs $18\frac{3}{4}$ feet can be carried over the bar of the river and $12\frac{3}{4}$ feet at low water, and 15 feet at high water neaps.

The town of Victoria, capital of the province of Espirito Santo, and built like an amphitheatre, stands on the north side of the river about 3 miles west of Moreno point, and less than half a mile westward of a remarkable conical peak, named Paõ de Açucar 445 feet high, on the south side of the river. It is partly in ruins, has a mean appearance, and may contain between 4,000 and 5,000 inhabitants. The climate here is considered humid, caused by the height of the surrounding hills. There is very little foreign trade at this port. In 1860, 36 vessels,

amounting to 3,971 tons, belonging to the coasting trade, cleared inwards ; and 34 vessels, amounting to 3,860 tons, cleared outwards.*

Water may be had by sending canoes a little up the rivers ; other supplies are scarce and dear.

TIDES.—It is high water at Espirito Santo, at full and change, about 3 h., and the rise 6 feet, but the tides are not regular.

ANCHORAGE.—Large vessels should anchor in the bay with the college at Victoria in line with Moreno point, in 11 to 13 fathoms water, muddy bottom, a mile from the outer sunken reef.

DIRECTIONS.—From the anchorage in the bay, steer in north of the outer reef, with the hill north of the town bearing W. by N. $\frac{1}{4}$ N., and in line with the north side of isle do Boi, the south island ; when the battery on the point under the convent of N.S. da Penha, opens north of the Balea rock, steer with it a little on the port bow, and pass about a cable's length north of the Balea in 6 fathoms water. To steer in south of the outer reef, bring the hill north of the town a little open southward of the building on isle do Boi, and steer in until the battery is open north of the Balea, then proceed as before.

There is a narrow channel between the Balea rock and Moreno point having 13 feet water, and is often used by the pilots. Having passed the Balea rock, the route is along the south shore ; the depth over the bar will decrease to about 13 feet at low water, increase to 16 feet off the battery, and deepen within. Steer north of the large islet in the middle of the river, in from 5 to 11 fathoms water ; after passing it, keep close along by the base of the Paõ de Açucar or Sugar loaf, in $5\frac{1}{2}$ to 11 fathoms ; from thence to the anchorage off the town the water shoals to rather more than 3 fathoms. Two buoys mark the channel over the bar ; the deepest water is southward of them.

The **ASPECT** between Espirito Santo and Rio de Janeiro is that of a series of high mountains, which at first appear isolated or united in groups, beginning at the rio Parahiba near Campos, and forming the great chain running to the south-westward ; they are known by the names of serra do Irubé, Goita Cazes, Macahé, and Orgaos. These mountains are remarkable by their sharp peaks, broken pyramidal and angular forms, such as the frades de Espirito Santo, Itapemirim, the serra do Pico, the frade de Macahé, and the pipes of the organs of Rio de Janeiro. Their summits vary from about 4,000 to 5,580 feet in height, and are visible at a distance of 60 to 75 miles ; but situated 30 miles in the interior, and the land often covered with fog or haze, they are not of much use to the mariner ; it is generally at sunrise when they are most visible. The large boggy plains which extend from their base to the coast form the low

* See Plan :—Espirito Santo Bay, No. 546, scale, $m = 5.0$ inches.

land of Cape St. Thomé, which is often blended with the sea, and visible only at about 4 or 5 miles.

The COAST.—At $1\frac{1}{2}$ miles to the south-east of mount Moreno are the Pacotes rocks, above water; and at about $6\frac{1}{2}$ miles to the south-west of the Pacotes is Cape Jicu. Between, the coast is bordered by several patches of rock at the distance of more than a mile. At about 19 miles southward of Cape Jicu is a group of five or six small islets, named Guarapari, with 7 fathoms water close to them; the two largest islets are $2\frac{1}{2}$ miles from the coast, and are visible 10 or 11 miles. Between these islets and the coast there is a passage for small vessels. At about 5 or 6 miles farther south are two other islets at 5 miles from the coast, and nearly on the parallel of the mouth of the river Guarapari. The first, called Raza, is a flat rock about 10 feet above the water, and divided into two parts. The second is a round sandy islet, 18 or 20 feet high, called Calvada, and visible 8 miles off. From the mouth of the Guarapari the coast, composed alternately of small beaches and red cliffs, runs to the south-west for 12 miles to Benevente point.*

Large vessels may pass within the Raza and Calvada islets in depths of from 18 to 11 fathoms. The coast here is of moderate height, almost covered with small trees close to each other, and having in places low yellowish cliffs which are not to be found southward of Benevente point. In the interior of the country are several groups of remarkable mountains, conical, upright, and inclined, which give to this part of the coast an appearance different from that north or south of it. The islets Calvada, and Guarapari are difficult to recognize from each other unless close to them.†

At 35 miles eastward of Espirito Santo there are 82 fathoms water; the same depth will be found at 50 or 55 miles off Cape St. Thomé, and at 35 miles south of Cape Frio and the coast of Rio de Janeiro. Within these limits the soundings decrease regularly to the shore. To the northward of Cape St. Thomé there are from 11 to 14 fathoms at from 15 to 20 miles from the shore, corresponding to the low land of the coast; but to the southward the water deepens rapidly, and near Cape Frio there are from 27 to 33 fathoms at a mile from the shore.

The bottom is in general fine sand, gravel, broken shells, and near the banks of St. Thomé the sand is white and fine, and at times red sand is found, by the aid of which the Brazilian mariners frequently know of their approach to the bank.

RIVER GUARAPARI.—The entrance to this river, having $19\frac{1}{2}$ feet water at springs, and 18 feet at neaps, is about 30 yards wide, lies W.N.W.

* See Chart:—South America, East Coast, Sheet 6, No. 530, scale, $d = 3.0$ inches.

† Commander Boys, H.M.S. *Express*, 1854.

6 miles from isle Calvada, and runs into the sea between two small woody hills. The point at 5 miles to the north-east is named Perro de Caõ; the south point of entrance to the river is 50 to 60 feet high, and has a church with a steeple, several houses, and a tall palm tree on it, being the only one in the vicinity of the river; and to the south of it are some small red cliffs. Vessels of nearly 19 feet draught can enter this river at high water springs, as there is no surf, and lie moored head and stern in 5 or 6 fathoms water. There is a sand bank a short distance inside the bar, avoiding this, the water is deep for about a mile up. The village is 3 cables within the entrance on the right bank. There is anchorage in the bay in 7 or 8 fathoms water, sheltered from north-east and south-west winds.*

BENEVENTE BAY.—From Benevente point the low shore forming a bay trends to the north-east and round westward for about $2\frac{1}{2}$ miles to the entrance of the river and town of the same name. From the point a dangerous reef extends to the south-west for $1\frac{3}{8}$ miles; the outer part of it forms two detached shoals about half a mile in extent W.N.W. and E.S.E., leaving a space of nearly half a mile in breadth, having $4\frac{1}{2}$ to 6 fathoms water, between them and the inner part of the reef.

The Baixo Grande, the southernmost of these outer shoals, having 3 to 5 feet over it at low water, and 5 or 6 fathoms close to it, lies with Benevente church bearing North, Benevente point N.E. by N., and Francesa islet W.S.W. To the north-west of the Baixo Grande is the Cormorant shoal, a coralline patch about a cable in extent, with $2\frac{1}{2}$ fathoms over it, and 5 and 6 fathoms round it. It lies with Benevente church bearing N. $\frac{2}{3}$ E., and Benevente point N.E. $\frac{1}{2}$ E. At low water springs the greater part of the inner reef is uncovered.

The town of Benevente stands on the east point of entrance to the river. The mouth of the river, about $1\frac{1}{2}$ cables wide, is easy of access; the bar has 9 feet over it at springs, 6 at neaps, and never breaks but with strong southerly winds. Within the river there are $1\frac{1}{2}$ and 2 fathoms water. Stock of all kinds at moderate prices may be procured.†

ANCHORAGE.—A good berth will be found in $4\frac{1}{2}$ fathoms water, muddy bottom with sand, with Benevente church bearing N. by E., the point E. $\frac{1}{3}$ S., and the south Puime islet W. by S.

TIDES.—It is high water at Benevente, full and change, at 3 h.; and the rise of tide is 5 feet.

DIRECTIONS.—Bring Francesa islet, at about $5\frac{1}{2}$ miles south-west of Benevente point to bear W. by S. $\frac{3}{4}$ S. and steer for it, which will lead in south of the Baixo Grande, or the south Puime islet bearing

* H. B. Akaster, Master, H.M.S. *Star*, 1854.

† Commander C. M. Luckraft, H.M.S. *Cormorant*, 1851.

W.N.W. will also lead to the southward of the shoals. When Benevente church, which is whitewashed and stands a little above the town, bears N. b. E. $\frac{1}{2}$ E., steer for it, and a vessel will pass about a third of a mile westward of the shoals in 7 to $4\frac{1}{2}$ fathoms water to the anchorage.*

PUIME.—A small town standing on the south point of entrance to the river of the same name, about $4\frac{1}{2}$ miles W.S.W. of Benevente. Boats only can enter the river; but there is a well-sheltered anchorage outside it for coasting vessels, formed by three islets close together lying nearly north and south. The water in the river is good, and may be easily procured in fine weather, by anchoring in 4 fathoms water, about a mile from the south Puime islet, or farther out for a vessel of large draught.

ITAPEMIRIM.—A town standing on the south side of the river of the same name about $1\frac{1}{2}$ miles from its entrance, at about $12\frac{1}{2}$ miles south-west of Benevente. The bar of the river has 9 feet on it at high water springs, and 6 feet at neaps; but it is dangerous for boats after strong northerly winds. There are three islets off the mouth of the river, the outer two named White and Egg islets, with depths of 4 to 6 fathoms between them, but no vessel should use this passage unless in cases of necessity. There is anchorage in 7 fathoms water, mud bottom, with Francesa islet bearing N.N.E. $\frac{1}{4}$ E., and the entrance to the river S.W. $\frac{1}{2}$ W.

The Coast.—From Benevente the low shore runs to the south-west for 11 miles to the mouth of the river Itapemirim. At about midway is some high land, the north part of which, named mount Arga, is 820 feet above the sea, and about half a mile from the shore abreast it are some rocks partly uncovered. At 3 miles S. $\frac{1}{2}$ E. from the mount and one mile from the coast is the islet of Francesa, about 150 feet high, having a reef extending about half a mile from its east point with 6 fathoms water close to it. Between the islet and the shore there are from one to 2 fathoms water. White islet, about a mile from the shore, off Itapemirim river, is about half a cable in length, with a rock about the same distance from its north-east end, and a reef extending a cable from its south-west end, having 6 and 5 fathoms water close to the breakers at its south west edge. At 5 miles East from the bar of Itapemirim, is a bank about a cable in diameter, with 5 fathoms water on it.

At about $3\frac{1}{2}$ miles south-west of White islet, on the summit of a hill, is a remarkable tree. Between lat. $21^{\circ} 9'$ and $21^{\circ} 12'$ are four or five large red cliffs, separated by narrow valleys, in one of which is the village of Villa Nova. These cliffs, named the Barreiras de Siry, form one of the

* See Chart:—Benevente to Itapemirim, No. 2,078, scale, $m = .75$ of an inch; with Plan of Benevente Bay, scale, $m = 3.0$ inches.

best marks for this part of the coast. A small islet lies about a cable's length from the middle cliff. The coast to the south is a low woody plain to within a mile of Itabapuna, at 7 miles farther on. At about 4 miles eastward of these cliffs, a 3 fathom bank is marked on the chart, but its position is doubtful. To the south of the Itabapuna are some small red cliffs, the last on this coast. Retiro point at 3 miles from Itabapuna is surrounded by reefs on which the sea breaks and extend a mile off.

From the parallel of Benevente to that of Santa Anna islets, in about $22^{\circ} 25' S.$, the coast is backed at from 20 to 25 miles in the interior by a remarkable chain of mountains, leaving between a low extensive plain. Mount Campos, in about lat. $21^{\circ} 23' S.$, is a remarkable sugar-loaf peak, and when on a $W. \frac{1}{2} N.$ bearing leads to the mouth of the Parahibia do Sul.

RIVER ITABAPUNA.—The entrance to this river is northward of Retiro point and the southern small red cliffs, and will be known by several large white houses on the beach. The bar has $10\frac{1}{2}$ feet on it at high-water springs, and is dangerous with N.E. winds. Reefs extend off it to a distance of 2 miles. The north-west patch, which has several rocks above water, lies with the centre of the middle red cliff bearing S.W. by S., and the southernmost white house on the beach $W. \frac{1}{4} S.$; it then extends two-thirds of a mile in a south-east direction, with several rocks showing when the sea breaks on them.

From the north-east patch the red cliff bears S.W. $\frac{1}{2} W.$, and the white house $W. \frac{3}{4} N.$; it then trends south-westerly, and terminates above water, with the red cliff S.W. $\frac{1}{2} S.$, and the white house $W. by N. \frac{3}{4} N.$ There are 5 fathoms water close to on the south-east side. To the north-east of the reef the soundings increase gradually. When standing in for the town during southerly winds, a vessel should pass northward of the reef, with an isolated conical hill bearing $W. by S.$ Anchor with the north-west breakers $S. by E.$ With northerly winds a vessel should anchor southward of the reefs. The anchorage is indifferent.*

The RIVER PARAHIBIA do SUL has its source in the eastern part of the province of São Paulo, on the north side of the Serra do Mar; runs first westward, then bends abruptly E.N.E., and enters the province of Rio de Janeiro; after a tortuous course of more than 500 miles runs into the sea at the village of São João da Barra. The river is much obstructed by sand-banks close down to its mouth, which is named Barra da Campos, and where there are about 8 feet at high-water springs, but it is dangerous after heavy rains or fresh breezes.

The land here is low and difficult to distinguish. The Barra da Campos is in lat. $21^{\circ} 36' 30' S.$, and will be known from the south-west by a high

* H. B. Akaster, Master H.M.S. *Star*, 1854.

circular hill with a remarkable mound on its top. On the sand near the mouth of the river is a flag-staff, on which a flag is hoisted when it is practicable to cross the bar in a trading vessel, but which it is difficult to distinguish from the vessel's masts inside when to the southward; from the north it is very conspicuous, as also the sand where it is erected. The city of Campos is about 25 miles up the river on the right bank.

The most convenient anchorage off the bar will be found with the flag-staff bearing between S.S.W. and S.W. Coasting vessels anchor here when obliged to wait for wind and tide to cross the bar. With the wind on the shore there is generally a heavy sea. Discoloured water is found a long way off, but it is deep, and continues so close in shore. There are two channels over the bar marked by stakes on the port hand, and on the starboard hand by stakes with branches on them; the sands are changeable. A pilot attends at the bar to guide the vessel.* There is a considerable trade here.

CAPE ST. THOME.—The low, uniform sandy shore slightly covered with vegetation known by the name of Cape St. Thomé, and about 45 miles from the interior mountains, curves gradually to the south round to the westward, having no salient point, and visible only at a distance of 4 or 5 miles. On the southern sweep of the shore, in lat. $22^{\circ} 3' 10''$ S. and long. $2^{\circ} 6' 30''$ East of fort Villegagnon,† or 41° West of Greenwich, is a house visible 5 or 6 miles. At about $5\frac{3}{4}$ miles to the north-east of the house are three trees higher than the others, and nearly $1\frac{1}{4}$ miles to the northward of them is a sandhill.‡

* Commander Boys, H.M.S. *Express*, 1854.

† E. Mouchez, of the French Imperial Navy, 1862.

‡ In a very curious manuscript atlas of the commencement of the 17th century, which may be seen in the Imperial library, and the existence of which was pointed out to me by M. Ferdinand Denis, there is a series of charts representing with remarkable accuracy for the time the whole coast of Brazil, with a list of all the ports and the principal rivers. The bank of St. Thomé is there very well delineated in form and position, and what is more singular, the Pilot bank re-discovered in 1843 is therein equally well laid down with soundings of 13 fathoms at some leagues only from the place now assigned to it.

It is difficult to explain that the bank of St. Thomé, which was so well known and delineated on the chart now more than 200 years old, had been so completely forgotten since that time, notwithstanding its importance, which is now well known, its existence was doubted, as Admiral Roussin did, although the Brazilian frigate *Prince Imperial*, in 1834, exaggerated it so much. The author of the atlas was named Texeira and not known by any other works.

I have also seen in the Imperial library another manuscript chart on parchment, bearing date of 1534, and the author Gaspar Viegas. Looking at it in a marine and geographical point of view, this chart appears to me one of the most precious specimens to be found of the remarkable accuracy with which the South American coast is drawn, scarcely 30 years after its discovery. The coasts of Europe and Africa are also laid

serra San João, 2,658 feet high, north of the river of the same name, and about $3\frac{1}{2}$ miles inland, is an isolated conspicuous mark, and 20 miles northward of it is the Frade de Macahé, 5,741 feet high, a remarkable peak leaning to the northward, with the serras of the same name running to the south-west, and those of the Imbé to the north-eastward.

From the Barra do Furado towards the Santa Anna islets the depths are regular, there being from 9 to 12 fathoms water, sandy bottom, at 5 or 6 miles from the land; outside this distance the bottom is gravel, sand, and shells. At 12 or 15 miles from the coast, to a distance of 6 or 7 miles from Cape Busios, there are 22 to 27 fathoms, muddy bottom. At more than 15 miles from the coast the soundings in places are irregular, and midway between Cape St. Thomé and the mouth of the Macahé, and at about 16 miles from the coast, the depth is more than 50 fathoms, fine sand; and 6 or 7 miles outside it 32 fathoms.

The **HERMES ROCK** is about 12 yards in extent, N.N.W. and S.S.E., and 4 yards wide. It rises almost perpendicularly from the bottom, forming the three heads; on the south-east of which are 4 feet, and on the two others 10 to 14 feet at low water. The bottom around is mud, and the depths 5 and 6 fathoms, excepting for 5½ yards in a N.E. direction from the rock, where the depth is 4 fathoms and the bottom coral. The water over the rock does not break. From the rock the church of Santa Anna bears W. by S. $\frac{1}{2}$ S.; extreme north end of the Santo Anna islets S.S.E., distant $3\frac{1}{2}$ miles; centre of Papagaios islet S.W. $\frac{3}{4}$ W., $3\frac{1}{4}$ miles; Santo Domingo hill N. $\frac{3}{4}$ E.; and the summit of Imburo hill N.W. $\frac{2}{3}$ N., distant $1\frac{1}{2}$ miles from the beach.

The church of Santa Anna stands southward of the centre prong of the Iriry mountain. This mountain is small, detached, has four peaks, the centre being the largest and highest, and rises inland a short distance south of the port of Macahé. Imburo hill rises a little north of the town of Macahé, is the highest hill in its vicinity, and its summit is covered with wood and inclines to the south. Deitado hill is in the same direction as the preceding one, a little more inland, and having a large spot on it is easily recognized.

When bound to the northward from the anchorage off Macahé, to avoid the Hermes rock, do not steer to the N.E. until the vessel is eastward of the Santa Anna islets. If it is necessary to tack, in making the northern board, the church of Santa Anna should not be brought on with the Iriry mountain until the vessel is eastward of the meridian of the islets.

RIVER MACAHÉ.—The mouth of this river lies about N.W. $\frac{1}{3}$ W. distant $4\frac{1}{4}$ miles from the largest of the Santa Anna islets. It is about 70 yards wide, and admits vessels of 9 feet draught at high water. The town

of the same name, consisting of about 150 houses, stands on rising ground near the mouth of the river, where also, near the summit, is the church and flag-staff. If the flag is hoisted it is a signal that the entrance is safe. In the river water may be obtained in any quantity. At times the water from this river causes the sea in the vicinity of Santa Anna islets to be much discoloured, like that of a sand-bank.

SANTA ANNA ISLETS.—At the distance of about 21 miles N.N.E. from Cape Busion, and $4\frac{1}{2}$ miles from the entrance to the Macahé, are three small islets, named Santa Anna, lying in a north-east and south-west direction over a space of $2\frac{1}{2}$ miles. The centre islet, 492 high, is the largest. Two rocks above water lie off the north-east end of the easternmost islet, from which a shoal extends to the northward nearly a mile, with 10 feet water on it. The channel inside them is impeded by a bank extending from the north end of the largest islet to the main, with $3\frac{1}{2}$ to 5 fathoms water over it, the greatest depths being about half-way across. The bank is steep to on both sides, the water shoaling from 7 to 5 and $3\frac{1}{2}$ fathoms.

On the west side of the islets there is anchorage in 5 to 7 fathoms water, sheltered from easterly winds, but exposed to the south-west and north-east; with the latter there is seldom much swell. The best route to this anchorage is round the southern islet, which is clear of danger. Large vessels using this anchorage should carefully keep the south-west end of the large islet to the eastward of S.E., as the water shoals suddenly on the south-west side of the bank, and likewise towards a sandy beach on the large island. About the islets the soundings are regular, except the bank extending from the north end of the large islet towards the main.

About the middle of the sandy beach of the large islet there is a passage through the trees to a well of scanty and indifferent water; the sweetest may be obtained here in any quantity close to the beach.

ANISHANAH will be found with the south-west part of the large islet bearing South; the northern part E. $\frac{1}{2}$ S.; and Papagayos islet at the entrance of the river Macahé N.W. by W. $\frac{1}{2}$ W., in 7 fathoms water, about three quarters of a mile from the sandy beach. Large vessels should anchor rather to the southward with the south-west point of the large islet about S.E. $\frac{1}{2}$ E. with one mile or about 7 fathoms.

ANISHANAH BAY, on the north side of Cape Busion, affords the best anchorage to vessels from south-easterly winds, in from 3 to 8 fathoms water, mostly between 4 and 5 fathoms. A small bay, named Simon or White Bay, lies to the eastern entrance of the anchorage, and is $2\frac{1}{2}$ miles westward of it. A bank, low, wooded, with shoals extending four to north-east side, and a

the distance of one mile from it, in the same direction, is a rock which partly uncovers at low tides, with 12 and 13 fathoms water close to it. The highest peak of Ancora islet, east of the cape, in line with the north-east side of Branca islet, leads on the rock. Ancora islet, open northward or southward of Branca islet, leads clear of it.*

In the western part of the bay is Raza islet, with breakers to the southward of it; and at half a mile northward of it is a large rock uncovered. The bay has a white sandy beach, which extends to the morro St. João. The passage between Branca islet and the main should not be used in a sailing vessel unless with a fair wind; with steam it may be taken any time. The village consists of about 30 houses. Water, in small quantities, fruit, and poultry may be obtained.†

ANCORAS ISLETS.—At about 5 miles E. by S. from Cape Busios is the eastern and largest of two islets, seen at a distance of 20 to 25 miles, called Ancoras or Anchor islets. To the southward of the inner one is a large white rock and connected to it by a reef. The eastern islet, 361 feet high, is said to resemble a cardinal's hat. Between the islets there are 23 or 24 fathoms water, and in mid-channel between Cape Busios and the inner Ancoras there are from 18 to 21 fathoms.

The COAST.—From Criminso point, 344 feet high, at $1\frac{1}{4}$ miles S.S.E. of Cape Busios, the bold coast trends to the south-west for nearly $2\frac{1}{2}$ miles to Geriba point; between are two little bays with the small islet of Boi at the entrance to the northern one; in the southern bay is a sandy beach named the Praia do Ferradura. Xerme point is 11 miles south-west of that of Geriba; the coast between forms an indentation of about 3 miles deep with three semicircular bays, whose beaches are named respectively Praia do Geriba, Praia do Perdido, and Praia do Pontal; Emerina point, separating the two first bays, is 525 feet high; off it are two rocks above water, and a sunken rock a mile eastward of it.

Pero point divides the second and third bays; the shore is bold from thence to the south-west for 2 miles, as far as the Barra Nova, the entrance to lake Araruama at the north end of Pontal sandy beach. Here is the village of Cape Frio, with a small fort. Between Geriba and Xerme points, but chiefly fronting Perdido bay, are several islets extending $5\frac{3}{4}$ miles in a S.W. by W. and N.E. by E. direction, and in line with the outer Ancora islet. These islets, beginning from the north-east, are named Brew, Pargos, 213 feet high; Cavallos; Comprida, the largest and 358 feet high; Irmaões, and Papagayos 377 feet high; they are clear of danger, and 20 fathoms water can be carried along them at a distance of about 2 miles.

* See Plan:—Armacão anchorage, scale, $m = 1\cdot5$ inches, on Sheet 6, No. 530.

† Edwin Rowe, Master, H.M.S. *Indefatigable*, 1856.

CAPE FRIO, the southern extremity of the island of the same name, is high, rugged, and remarkable in its outline ; it forms the elbow of the province of Rio de Janeiro, is the south-eastern extremity of the coast of Brazil, and may be seen in clear weather from a distance of about 45 miles. When seen from the east or west the island appears like two mountains, the northernmost being about 1,570 feet above the level of the sea, and the southern one 1,300 feet. On a N.N.E. and S.S.W. bearing they appear as one mass, with a double summit like two small points.

At about three-quarters of a mile north-east of the cape is a small conical islet close to the shore ; and at nearly a cable southward of the cape is a rocky patch with $2\frac{1}{2}$ fathoms water over it. The 100 fathoms line of soundings curves round the cape eastward of it at the distance of about 68 miles, and southward of it at 35 miles, and there are from 30 to 50 fathoms water at 2 miles from the land.

LIGHT.—On Focinho do Cabo point, the southern extreme of Cape Frio island, is a round tower 53 feet high, painted light stone colour, which exhibits at the height of 522 feet above the mean level of the sea a white *revolving* light, attaining its greatest brilliancy every *minute and a half*, and is seen in all directions seaward through an arc of 225° , or when bearing between S.W. and East. The light should be seen in clear weather from a distance of 25 miles. The duration of the total eclipse is 45 seconds, but within a distance of 5 or 6 miles it may appear longer.

PORT FRIO, on the north-west side of Cape Frio island, is a secure anchorage, except with north-east winds. The harbour is about a mile in extent each way, having 10 to 17 fathoms water. The entrance between the north end of the island and isle Porcos, 360 feet high, is about 6 cables wide, with 15 to 24 fathoms water over fine sand and mud. There is a narrow entrance at the south-west end of the island with depths of 10 and 12 fathoms, immediately within there is anchorage for small vessels ; farther to the north-east is a bar of white sand which stretches right across the harbour, and is plainly seen from a large vessel ; the shoalest part has only 10 and 11 feet water over it, so that this passage is fit for small vessels only.

A small fort stands on a rocky point between two sandy coves on the north-west side of the harbour, and a little within the fort is a small village, occupied chiefly by fishermen. Water may be had from wells in the coves as well as on the island near its west end.*

TIDES and CURRENTS.—South-west and north-east winds produce

* See Plan:—Port Frio, scale, $m = 1\cdot7$ inches, on Sheet 6, No. 530.

north-east and south-west currents, from a half to $1\frac{1}{2}$ knots an hour. With south-west winds, there is a south-west eddy inshore, the currents usually precede the winds. It is high water at Port Frio, full and change, at 11h. 40m., springs rise $4\frac{1}{2}$ feet; south-west winds raise the water two or three feet.

WINDS.—The winds off Cape Frio are seldom found to the southward of East; and in the northern monsoon they are generally to the northward of N.E. Heavy squalls are occasionally met in rounding the Cape, which require every precaution.

THE COAST.—From Cape Frio to the entrance of Rio de Janeiro the course is nearly West and the distance 63 miles. The coast between is everywhere steep-to and consists of a high yellow sandy beach, backed by high land a few miles to the northward, showing in peaks and hills. At about 26 miles eastward of Rio de Janeiro the sandy beach is interrupted by Cape Negro, a dark level piece of land about half a mile in extent and some 80 feet high, which terminates abruptly and may be recognized by the land at its back being very high and dark, with more irregular hills to the eastward. At $10\frac{1}{2}$ miles eastward of Cape Negro, on a sandy hill, is a church in ruins dedicated to Nossa Senhora de Nazareth.

The shore is here called Masambaba, and within it is the Araruama lagoon, extending from its entrance at 6 miles northward of Cape Frio island westward for about 15 miles. Between the two capes at the distance of 5 miles from the coast, there are from 31 to 38 fathoms water, sand, gravel, and broken shells, and at about 35 miles from the shore is the 100 fathoms line of soundings. North of the Maricas islets near the beach, and 3 or 4 miles eastward of the False Sugar loaf, is a remarkable round hill, about 850 feet high, with the western side of its base level with the low land, and much resembling Redonda island. This hill will point out the position of the Maricas islets.

MARICAS ISLETS.—At 13 miles westward of Cape Negro, and about 3 miles from the beach, are two islets, named the Maricas, of moderate height, and may be approached with safety. The water near the islets is deep and there are no dangers but what are in sight; they are steep-to on the south side, and at $1\frac{1}{2}$ miles westward there are 17 fathoms water, and 10 fathoms close to. On the eastern side the sea commonly breaks with great violence. Between the islets and the main there are 13 and 10 fathoms water, close to the beach. Temporary anchorage, with fine sandy bottom, will be found westward of the islets with northerly winds. There is landing near the north-west end of the larger islet.

CHAPTER IV.

RIO DE JANEIRO TO CAPE CASTILLOS AT THE ENTRANCE TO THE
RIO DE LA PLATA.VARIATION, $1^{\circ} 50'$ West to $8^{\circ} 0'$ East in 1864.

RIO de JANEIRO.—This harbour is one of the largest in the world, and can scarcely be excelled. It covers a space of about 16 miles in a north and south direction, gradually widening from about three-quarters of a mile at its entrance to 15 miles at its head, where it extends W.S.W. and E.N.E. It is interspersed with numerous islets, surrounded by high wooded mountains which terminate in an easy declivity to the sea; its shores are scattered with villages, country seats, and various plantations; many rivers run into the harbour, and around it are several sandy bays. The entrance is bounded on the west by the base of the Paõ de Açucar or Sugar loaf with fort San Juan immediately within it, and on the east at $8\frac{1}{2}$ cables from the latter, by fort Santa Cruz at the foot of a mass of granite.*

At 3 cables north-east of fort San Juan is a low square fort named Da Lage standing on some isolated rocks, on which, in strong breezes, the sea breaks with violence; and at $1\frac{1}{2}$ miles farther in on the west side is the island and fort of Villegagnon. There are no dangers in entering the harbour; the least water is $5\frac{1}{2}$ fathoms, at nearly half a mile south of fort Santa Cruz; and for a distance of 2 miles outside the forts there are from 7 to 10 fathoms; between the forts there are from 12 to 26 fathoms; and within, deep water all the way to the anchorage off the town. To the northward of the anchorage the water continues deep, and the harbour is navigable for small vessels in every part of it.

Fort Santa Cruz, which forms the principal defence of the harbour, is a work of considerable strength, has three platforms, one over the other, on the side facing the sea, and mounts altogether 120 guns. It is flanked by batteries on the east and west, and protected by a regular front for musketry on the land side. Ilha das Cobras or Serpents island, at the north-east part of the city, is strongly fortified; the highest part being nearly 80 feet above the sea. The island slopes gradually on the east side to the water's edge.

* See Plan :—Rio de Janeiro Harbour, No. 541; scale, $m = 1\cdot5$ inches.

A bar of sand with some rocks extend to the southward from the island for a distance of half a mile, fronting the town, and leaving a small passage between the south end and Calhabouco point. The least water on this bar is one fathom; and between it and the city are from 2 to 7 fathoms; here all merchant vessels, when there is room, discharge and take in their cargoes. The passage for large vessels is round the north side of Cobras. Off the east end of the island is Rat islet with some rocks between. There are several minor fortifications in other parts of the harbour.

The city of Rio de Janeiro, capital of the province, and the most important town in Brazil, stands on the western side of the harbour, at about $2\frac{1}{2}$ miles from its entrance, at the foot of a high range of mountains called the Corcovado, which bounds the plain on the west. It is built on level ground, somewhat in the form of a parallelogram, and from the harbour has a most pleasing appearance. The streets are straight, intersecting each other at right angles, paved with granite, with a gutter in the centre. The houses are mostly built of granite, seldom more than two stories high, rough or whitewashed, with red tile roofs.

The older portion of the city, or that adjoining the sea, is divided on the west from the new town by a large open space called Campo de Santa Anna. Parallel with the beach is the main street named Rua Direita. The royal palace forms two sides of an oblong space open to the sea, near the landing place. It consists partly of the old palace of the viceroys, and partly of a convent formerly belonging to the Carmelites, and is without architectural beauty. Among the other public buildings is a handsome theatre, the exchange, the old college of the Jesuits, and the episcopal palace, and royal villa of Christovao, in the environs.

The city contains about 60 churches and chapels; of these that of Nossa Senhora da Gloria is one of the finest, and occupies a site on a lofty hill that juts into the sea between the city and Praia Flamingo, and is a conspicuous object from the harbour. From the city the suburbs extend westward; and to the southward along the west side of the harbour to Botafogo. Water is supplied from the Corcovado, by a magnificent aqueduct, constructed in 1740; it is thence conveyed to public fountains in different parts of the city, and families supplied by carriers.

The botanic gardens, about 8 miles south-west of the city, is a place of great resort. In the rear of the town are several ranges of hills which shoot off in irregular spurs from the neighbouring mountains, leaving between them flat intervals of greater or less breadth. Along the bases of these hills and up their sides, are rows of buildings whose whitened walls

and red tiled roofs form a pleasing contrast with the deep green foliage that surrounds them. Small steamers ply regularly between Rio and Nitherohy on the opposite side, and to Piedade at the head of the harbour.

The population in 1862 was about 210,000. The principal articles of import are cotton and silk manufactures, flour, wine, hardware, salt fish, butter, coals, cordage, copper, iron, lead, leather, paint, salt, tea, vermicelli, wax, &c. ; and the exports are coffee, sugar, hides, horns, rice, rum, rosewood, ipecacuhana, tobacco, tapioca, &c. In 1858, 1,066 vessels amounting to 400,956 tons cleared inwards ; and 1,075 vessels equal to 341,319 tons cleared outwards. In 1857 the value of the imports was 67,922,825 milreis, and that of the exports 55,121,675 milreis.*

Supplies.—All kinds of supplies can be obtained in abundance at Rio, and the port is preferable to any on the coast. Vessels may heave down and repair, but everything is very expensive. Water is supplied from floating tanks, both for vessels of war and merchant vessels. The latter calling for refreshments only, are allowed to enter the harbour, without paying anchorage dues, but are subject to all other port charges.

Docks.—On the north side of Ilha das Cobras is the naval arsenal with a dock 301 feet in length over all, 284 feet on the floor, 92 feet in breadth, 70 feet at the entrance, 30 feet on the floor, 33 feet deep, and 28 feet over the sill.

The dock is closed by a caisson, not let into a groove, but with a strong lip of india-rubber which shuts tight against the granite. The water can be pumped out of the dock in four hours by a forty horse power engine. Another dock of larger dimensions is being built alongside the above.

ISLANDS OF THE ENTRANCE.—Several small islands lie off the entrance to Rio ; on the east side are those of Pay and May (Father and Mother) ; the former lying 4 miles south-west of fort Santa Cruz, and the latter three-quarters of a mile more to the eastward, with a depth of 20 fathoms between them. A reef extends from the east end of May island, with a depth of 20 fathoms between it and Menina island close to the shore. These islands are otherwise steep-to.

Raza island, about 4 cables in length, and about 270 feet high, lies S.W. $\frac{3}{4}$ S. $5\frac{1}{2}$ miles from Pay island, and when seen from the eastward appears not unlike a slipper, with the sloping part northward. A square red light tower, 50 feet high, stands in the centre of the island, and there is a flagstaff, with a landing place at the north-west end. An islet lies close off its north point. The depth of water between this island and Pay is from 16 to 26 fathoms, gray sand and mud.

* The average exchange of the milrei is about 2s. 3½d.

Redonda island, 726 feet high, resembling a haycock, lies about W. $\frac{1}{2}$ S. $2\frac{1}{3}$ miles from Raza, with 23 to 32 fathoms water between them. A small islet lies at a cable from its south-west side; and about a mile south-west from the summit of Redonda is a dangerous reef awash. At $1\frac{3}{4}$ miles northward of Redonda is Comprida island, with 18 to 22 fathoms water between them; and close to the north of the latter are Palmas and Cagada. At half a mile E.N.E. of Cagada, the easternmost island, is a reef of rocks, another close to its south-east side, and two reefs between it and Comprida.

On the west side of entrance to the harbour, at $6\frac{1}{2}$ cables southward of the base of the Sugar loaf, is an island named Cotundubu or Tucinho, having between 9 to 13 fathoms water, over sandy bottom. A reef extends a little southward from the island, with 10 fathoms close to it.

LIGHTS.—The light tower on Raza island exhibits at the height of 315 feet above high water, a *revolving* light, attaining its greatest brilliancy every *two and a quarter minutes*, showing alternately *red* and *white*. The light should be seen in clear weather from a distance of 10 to 14 miles.

At fort Santa Cruz, on the eastern side of entrance to Rio de Janeiro harbour, is a *fixed* white light, visible 6 miles.

On Calhabouco point, at the south-east extreme of the city, is a small *fixed red* light.

TIDES.—It is high water at Rio de Janeiro, full and change, at 3h.; springs rise 4 feet and neaps 3 feet. The usual rate of the tide is about three-quarters of a mile an hour, springs run $1\frac{1}{3}$ miles. The ebb runs much longer than the flood, especially after heavy rains, and it has been known to run a whole day without intermission; strongest on the western side, but an eddy will sometimes be found on the eastern side, when the water is observed to rise. At the anchorage in front of the town the stream is occasionally irregular.

WINDS.—The sea breeze generally sets in between 10 and 1 o'clock in the forenoon, and ceases in the evening between the hours of 7 and 11. The land wind blows all night, ends at 9 or 10 o'clock in the morning, and is succeeded by an interval of calm. At the full and change of the moon heavy squalls from the north-west, named "Terre Altos," immediately succeeds the sea breeze, lasting from four to six hours.

ANCHORAGE.—Vessels of war anchor anywhere eastward of the city, but southward of a line drawn from Rat islet to the largest church having two towers, and with the Paõ de Açucar or Sugar loaf open eastward of fort Villegagnon, in 15 to 21 fathoms water, muddy bottom; or more westward if convenient, with the Sugar loaf over the western house in fort Villegagnon in 7 or 8 fathoms. Vessels generally moor open hawse to S.W. Merchant vessels anchor northward of Ilha das Cobras,

in $5\frac{1}{2}$ or 6 fathoms ; and coasters off the city southward of Cobras. The authorities require all vessels to have buoys on the anchors.

There is also anchorage between fort Santa Cruz and Three-fathoms bay, on the eastern side of the harbour, in 5 or 6 fathoms water.

DIRECTIONS.—The entrance to the harbour of Rio de Janeiro is known by several remarkable mountains in its immediate vicinity. The Paõ de Açucar or Sugar loaf rises in that form from a tongue of land on the west side, to the height of 1,270 feet, and differs from the many others on this coast by the inclination of its summit to the westward. At $2\frac{3}{4}$ miles westward of the Sugar loaf is the peak of the Corcovado, 2,272 feet high ; from thence the mountains range to the westward, and at the distance of 5 miles, and about $1\frac{1}{2}$ miles northward of Cape Gavia, is the mountain of the same name, 2,575 feet above the sea, with a remarkable flat top like an immense cube, with perpendicular sides, seen in all directions seaward from east to south-west, and cannot be mistaken.

When the summits of these mountains are free from clouds they present in a remarkable manner the figure of a man lying on his back, the Gavia forming the head and the Sugar loaf the feet. On the eastern side of entrance, at $6\frac{1}{2}$ miles eastward of fort Santa Cruz, at the western termination of the high land, is the False Sugar loaf, rising close to the shore to the height of 1,317 feet. At 3 or 4 miles east of the False Sugar loaf is a remarkable round hill about 850 feet high, sloping on its west side to its base on a level with the low land ; its east side, about half-way down, forms a notch with some nearly table land eastward. Farther eastward is the summit of a distant range, called, from its resemblance, Castle hill.*

A sailing vessel from the northward or eastward during the north-east monsoon should make Cape Frio, and a berth should be given the coast between the cape and Rio, as a constant and sometimes a heavy swell sets in ; but during the south-east monsoon the Ilha Grande, Le Morro de Marambaya, or the Gavia are the best objects to make. The islands at the entrance of the harbour should not be approached until the sea breeze is well set in, as a vessel may run into a calm between the sea and land winds, and be exposed to the swell and current amongst the islands. Whilst the sea breeze is strong enough to enable vessels to overcome the ebb tide, they may safely enter by day or night.†

* A few leagues southward of Rio is a good situation for enjoying a general view of the picturesque mountains in its vicinity. When near the shore one only sees those of an inferior order ; and it is not until an offing is gained that the bold and varied outlines of the distant Organ mountains (so called because they have a number of pinnacles somewhat like the pipes of an organ), the sharp peak of the Corcovado, and the singular heights over Tijuca, can be seen at once.—ADMIRAL FITZROY.

† When vessels enter the harbour at night, a signal is made from fort Santa Cruz to the city, which is not to be understood as interfering with the vessel's entering.

The land wind is often accompanied by gusts which are sometimes heavy, especially at the full and change of the moon, but they seldom extend outside the islands; and as the current is nearly always running out, if there is any doubt about reaching the anchorage a sailing vessel should keep outside Raza light, and wait for the sea breeze on the following day. If, however, a vessel is compelled to anchor, it is better to close with the eastern shore, where there is less swell.

The passage between Raza and Pay islands is the widest, and generally used. The islands are steep-to, and a vessel may pass close to them on either side. There are no dangers, nothing to avoid that is not seen, and deep water on both sides of the entrance. Vessels are required to pass within hail of fort Santa Cruz to answer any questions that may be asked; it is not necessary to shorten sail, and there is plenty of water close to the rocks. After passing the fort steer about N.N.W. for the anchorage. A steam vessel at night should bring Raza light to bear S. $\frac{1}{2}$ W., and steer N. $\frac{1}{2}$ E. for Santa Cruz light; pass within hail of the fort, and proceed as before.

The water will then deepen, and the soundings will be lost for a short time with the hand lead. Villegagnon fort may be passed at the distance of 2 cables. From the outer part of the fort the 3-fathoms line of soundings is nearly in line with Rat islet. Vessels should therefore keep eastward of this line. At $1\frac{1}{4}$ cables N. by E. $\frac{1}{2}$ E. from Rat islet is a 4-fathom patch. Merchant vessels are required to anchor a little below Villegagnon fort, where they are visited by the health officer.* The passage between forts San Juan and Lage should not be used in a sailing vessel, as the tides are irregular, and the wind may become variable under the Sugar loaf.

Vessels about to leave the harbour usually get in the fairway on the evening before departure, and weigh in the morning with the land wind, which will generally carry a vessel outside the islands.

ROUTE to the NORTHWARD.—Vessels bound from Rio to the northward during the months of November, December, January, and February meet with fresh N.E. winds which extend along the coast, especially in the vicinity of Cape St. Thomé, and which causes a southerly current of about one or $1\frac{1}{2}$ miles an hour, stronger near the coast than in the offing.

* Merchant vessels passing Villegagnon fort are liable to be fired at and fined. The price of the first gun is 7s., the second 14s., the third 3l. The master is required to deliver to the health officer all letters and papers without exception, consignees' letters and all. If any should afterwards be found on board, the vessel is fined. The harbour regulations will be given at the time of arrival by the guard mor; they are in Portuguese, French, and English. They must be returned before the vessel leaves the port.—*Nautical Magazine*, June 1853.

During this season the wind is less northerly in the offing than near the coast, it is therefore necessary for a sailing vessel to stand from 450 to 600 miles to the E.S.E. and then tack, when the wind will be more to the eastward, and the southerly current less strong.

The month of November and especially December are the most unfavourable for vessels going to the northward, when it is necessary to stand well to the eastward; but during the two or three other months of the N.E. monsoon, *i.e.*, October, January, and February, a vessel should not stand farther eastward than actually necessary for weathering the Abrolhos islets, as from their parallel northward the winds will be about East or E. b. S.

During the other months of the year, from March until October, a vessel should close the coast as near as possible, taking advantage of the change of wind near the land, and making short tacks to the eastward on meeting the fresh N.E. winds off Capes Frio and St. Thomé, which sometimes blow during the S.E. monsoon; but they last only two or three days, and are succeeded by calms and light variable winds from S.W. to S.E. Then continue along the coast at the distance of 30 to 90 miles. A more easterly route is generally used, but if bound to Bahia, it does not appear advantageous to stand too far off the land.

TIJUCAS ISLES are a cluster of small islets lying southward of Cape Gavia. The eastern islet named Meio lies S.E. by S. one mile from the cape; and the south-westernmost islet, which is about 200 feet high, S.W. $\frac{1}{4}$ S. $1\frac{3}{4}$ miles from the cape. About half a mile southward of the west end of the latter islet is a reef awash; and at two-thirds of a mile eastward of the islet is said to be another reef also awash.

GUARATIBA POINT rises in a conical form to the height of about 800 feet, and is the southern termination of the range of mountains that surround Rio de Janeiro. From off the point, Redonda island with its steep shores intersected with white and dark green, off Rio de Janeiro, may be clearly seen in fine weather.

MARAMBAYA ISLAND, about 22 miles in length east and west, and from three-quarters to $2\frac{1}{2}$ miles in breadth, is a bank of sand about 20 feet above the level of the sea. At the west end a hill rises to the height of 700 feet, called the Morro de Marambaya, and can be seen from a distance of about 30 miles. The island is more or less covered with creeping plants, brushwood, and mangrove. It is said to be steep on the south side, and the sea breaks heavily on it; on the north side it is level, and abounds with shell fish and sand larks. From Sena point, the north-west extreme of the island, a bank having only 2 fathoms water over it, extends N.N.W. $\frac{1}{4}$ W. $3\frac{1}{4}$ miles, leaving a passage about three-quarters of a mile in breadth between it and Guaiba island into Sapitiba bay.

From the point at about half a mile south-west of Sena point a reef extends westward about half a mile. As Marambaya island is low, with the exception of the morro at the west end, it should be approached with caution in thick weather.

THE EASTERN LAGOON, an islet about 18 or 20 feet above the sea, with bushes on its top, lies nearly on the meridian of 44° W., and about $2\frac{3}{4}$ miles from the shore of Marambaya island, with $9\frac{1}{2}$ to 17 fathoms water all round, and 22 fathoms $1\frac{1}{2}$ miles south of it.*

SAPITIBA BAY covers a space of about 20 miles east and west, with an average breadth of 6 miles north and south, and is protected by the Restinga or island of Marambaya. The western part of the bay is studded with numerous islands and rocks, having deep water and good anchorage between them; the depths vary from 15 to 2 fathoms, soft muddy bottom. At the east end of Marambaya, between it and Guaratiba point, is a passage about three-quarters of a mile wide, having 2 fathoms water, leading into the bay. With south-west winds a heavy sea sets in, which renders the passage navigable only for small vessels of about 6 feet draught.

At about $4\frac{1}{2}$ miles northward of Guaratiba point is that of Pedro, with an islet close off its south side, and about three-quarters of a mile westward is the entrance to the rio Pedro. From Pedro point the shore trends northward, and then westward to Sapitiba point, about $1\frac{1}{2}$ miles distant, forming a sandy bay with a village on its eastern side, and at $5\frac{1}{2}$ miles north-east is the village and church of Santa Cruz. Off Sapitiba point are two islands; at 2 miles west of it is a rocky patch, which uncovers at low water; and at $1\frac{3}{4}$ miles north-west of the point and about three-quarters of a mile from the shore, is another rocky patch which also uncovers at low water. At $2\frac{1}{2}$ miles north-west of Sapitiba point is the mouth of the rio Guandù, navigable for canoes.

From the mouth of the rio Guandù the shore runs to the north-west for 4 miles to that of the Taguahy, which is navigable for vessels of 4 or 5 feet draught. Here sugar is shipped for Rio de Janeiro. From the mouth of the Taguahy, as far as $2\frac{1}{4}$ miles westward of the meridian of the west end of Marambaya island, a distance of about 16 miles, are numerous islands and rocks. The two largest of these islands are high, and close to the main land; that to the eastward is called Madeira; but the passage between it and the main is nearly closed by a tongue of land, leaving a channel about 3 feet deep, and in many parts only 6 or 7 feet wide, with high trees on either side.

The westernmost large island named Tacuruzà is $3\frac{1}{2}$ miles in length east and west, and also lies close to the main. The next island in size is

* See Plan :—Sapitiba and Ilha Grande bays, No. 2,044, scale, $m = 0.4$ of an inch.
4291.

called Yaguano, which is high, and lies about 2 miles southward of the west end of Tacuruzà with several smaller islets around it. Close to the south side of the west end of Tacuruzà is the low bushy island of Macho, with a reef off its south point. About midway and in line from the southern part of Guaiba island to that of Vegeo Grandé the largest island at the west end of Yaguano, and about a mile northward of a cluster of rocks above water, is the Areia, a sunken rock with 21 feet over it, with 9 to 12 fathoms water close to.

At $3\frac{3}{4}$ miles N.N.W. $\frac{1}{2}$ W. from Sena point, the north-west end of Marambaya, is the island of Guaiba lying at the entrance of Mangaratiba cove on the north shore, with $6\frac{1}{2}$ to 19 fathoms close to. At about $2\frac{1}{2}$ miles S.W. $\frac{1}{2}$ W. from the south point of Guaiba island is the Flat rock, just awash, and steep-to; and about $1\frac{1}{4}$ miles eastward of the latter and $1\frac{3}{4}$ miles S. $\frac{3}{4}$ W. from the same point is a rocky patch, both of which must be carefully avoided.

DIRECTIONS.—Vessels bound into Sapitiba bay should round the Morro de Marambaya. At a mile westward in 12 or 13 fathoms water, steer for the west end of Guaiba island in not less than $5\frac{1}{2}$ fathoms, or by keeping a little westward a vessel will have deeper water, but the centre of Guaiba should not be brought to bear eastward of North in order to avoid the sunken reef lying S. $\frac{3}{4}$ W. about $1\frac{3}{4}$ miles from its south-west end. When about half a mile from the south point of Guaiba steer E.N.E., leaving the Yaguano group on the starboard hand; then steer for Pedro Branco, a white rock on the south side of Tacuruzà, which may be passed close to on the south side in 9 fathoms, water.

From Pedro Branco steer for a long half a mile southward of Macho island to avoid the reef off its south point, and then haul gradually up in from 5 to 7 fathoms, water, for the anchorage under the south side of Madeira island. Vessels may also anchor southward of Pedro Branco; northward of the Yaguano group, or westward of them; and vessels of light draught in any part of the bay.

MANGARATIBA COVE, about three-quarters of a mile in extent each way, lies on the main nearly north of Castellhanos point, the east extreme of Ilha Grande, or about N.W. by N. of the morro of Marambaya. Here is a village and church, and a vessel may anchor in 3 to 5 fathoms water. The deepest water is on the west side of the cove, as a flat extends from the village about half-way across. Vessels going into this cove should be careful to avoid the Flat rock lying about S. by W. $\frac{1}{2}$ W. from the anchorage. The rock is just awash, steep-to, and most dangerous in hazy weather.

ILHA GRANDE in the form of a triangle with its greatest side to the southward is high, about 17 miles east and west, and $7\frac{1}{2}$ miles north and

south. On the north-east side of the island are Palmas, Albroa, and Estrella bays, affording anchorage for the largest vessels in 6 or 7 fathoms, water, soft muddy bottom, and where water, wood, fruit, yams, pigs, and fowls may be procured. Sailing vessels should not anchor too close in, as the winds baffle from the high land round the bays, making it difficult to sail out. Vessels bound into Palmas bay with the sea breeze may pass between Palmas islet at the east point of entrance and the shore, in $7\frac{1}{2}$ to 10 fathoms, water, keeping the shore side aboard.

The channel is nearly a quarter of a mile wide; there are 8 fathoms water close to the outer rock of the reef, extending seaward from the islet, and in using this passage a vessel will save working into the bay.* A slight swell rolls into Palma bay, but Albroa will be found more convenient, and on its eastern side inside an islet is a small cove, with general depths of 7 fathoms, and 3 fathoms alongside the rocks, and is an excellent place for a moderate size vessel to refit.

Castelhanos point, the east extreme of Ilha Grande, is separated from Marambaya by a passage 5 miles in breadth leading into Ilha Grande bay north of the island, and through the channel between it and the main. The passage is clear, the water deep, and there is good anchorage on muddy bottom in any part of it. The land is high, and the scenery in all parts of the bay exceedingly grand. Vessels at times are liable to meet with baffling winds, the sea breeze not reaching through, particularly in the summer, when it sets in from the southward. The land wind blows from the north-east during the summer, and from the north-west in the winter.

At $1\frac{1}{2}$ miles northward of Grossa point, at the north-west entrance to Palmas bay, is Green islet with its summit covered with green shrubs, and at a mile north-east of it is Tree islet. Vessels may pass on either side or through between them. Off the north point of Ilha Grande is a cluster of islets, and at a mile south-east of the point and about two-thirds of a mile from the shore are some sunken rocks. The channel between the islets and the main land is about a mile in breadth, with depths of 10 to 21 fathoms.

From the north point of Ilha Grande to Angra dos Reis or Villa Grande are several islets with deep water between them. A reef extends to the southward from the islets off Fort point south-east of Angra dos Reis, which should not be approached within a distance of $1\frac{1}{2}$ miles. In the bay northward of Angra dos Reis the coast of the main land should be approached with caution as there are many unknown rocks only a few feet below the surface of the water, and not visible in fine weather.

* John H. Pridham, second master, H.M.S. *Riflemen*, 1859.

The Geyser rock with 3 feet water over it, lies West $1\frac{3}{4}$ miles from the south end of Japoya island, N. by W. $\frac{1}{2}$ W. about half a mile from Ponbaya islet, and nearly on the parallel of the north point of Ilha Grande. The rock has $7\frac{1}{2}$ to 11 fathoms water, at the distance of 2 cables all round it.

The western Lagé, a flat white rock, lies about 2 miles westward of Lorego bay, and $1\frac{1}{2}$ miles from the shore. At half a mile southward of Acaya point, the west extreme of the island, are some sunken rocks, and at $2\frac{1}{2}$ miles W. by N. $\frac{1}{2}$ N. from the point is a rock marked on the chart doubtful. Midway between the south-west end of Ilha Grande and the main land westward, the depths are 18 and 19 fathoms mud bottom. Ilha Mero lies off the south-west part of Ilha Grande, distant $2\frac{1}{2}$ miles.*

All that part of the coast north-west of Ilha Grande is imperfectly known; it is studded with many islands and rocks, and should be navigated with the utmost caution.

TIDES.—It is high water off Estrella bay, full and change, at 12h. 30m.; springs rise 5 feet, and neaps 4 feet. There is little or no stream.

DOIS RIOS.—At about $5\frac{1}{2}$ miles westward of the east point of Ilha Grande is the bay and village of Dois Rios. There are two islets in the bay with anchorage inside them for small vessels. About a mile southward of the east point of the bay is Jorge Griego island, said to be steep-to, with a bay on its north side affording anchorage for large vessels. A heavy swell sets towards the island.

THE COAST.—At about 9 miles W.S.W. from the west end of Ilha Grande is Joatinga point, forming the south-west extreme of Ilha Grande bay. The point is high, an islet lies close off it, and it may be approached at a prudent distance. At $5\frac{1}{2}$ miles to the south-west of Joatinga point is that of Cairoçu, also high, the coast between forming a bay. From Cairoçu point the shore trends to the westward and southward for about 25 miles to Grossa point. At $14\frac{1}{2}$ miles westward of Cairoçu point and 3 miles from the shore is Couvas islet, and $2\frac{1}{2}$ miles farther westward is another islet. About 11 miles westward of Cairoçu point and at $2\frac{1}{2}$ miles inland is the peak of Parati. To the northward of Grossa point is the town of Ubatuba.

PORCOS ISLAND.—At $4\frac{1}{2}$ miles southward of Grossa point is Porcos or Hog island, moderately high, about $2\frac{1}{2}$ miles in length and $1\frac{1}{2}$ miles in breadth. Off its south point is an islet with a passage between for boats; and two other islets lie off its east side at the distance of $1\frac{1}{2}$ and $1\frac{3}{4}$ miles, with 6 to 15 fathoms between. The two latter islets are wooded, $1\frac{3}{4}$ miles north and south of each other, with 6 to 11 fathoms water between them.

* John Thompson, second master, H.M.S. *Sharpshooter*, 1853.

On the north side of the island is a bay with a village at its head, nearly a mile in breadth and about three-quarters of a mile deep, where vessels may anchor in 5 or 6 fathoms water, muddy bottom. The bay is sheltered from all winds except those from N.E. to E. by N., which seldom continue long enough to cause a heavy sea, and is an excellent place for a vessel to refit.

In running for Porcos bay strangers will find the island a little difficult to make out owing to the high land northward of it, but as the water is deep close to there is no danger in standing on until the white house on the north-east end of the island is seen; passing inside, between, or to the northward of the islets. To the northward of the islets is preferable, as a vessel will avoid the shoal said to lie about E. by S. $\frac{1}{2}$ S. rather more than half a mile from the northernmost islet.* There is no tide here but what is caused by the prevailing winds; the rise is about 3 feet.†

Supplies.—Water is plentiful and easily obtained from the south-east part of the bay. There are several small villages on the mainland where fresh beef and stock may be obtained.

FLAMINGO BAY.—The north-west point of Porcos island forms with a point projecting from the mainland a narrow channel rather more than a quarter of a mile in breadth, carrying 20 fathoms water, through which vessels can pass when the wind is steady by not keeping too close to either point into Flamingo or Shark bay. This bay is about 2 miles deep, more than $1\frac{1}{2}$ miles in breadth, and has good anchorage in 5 to 7 fathoms water, except with southerly winds which sets in a heavy swell.

There is anchorage for small vessels, soft bottom, on the southern side of a cove at the north-west part of the bay. The village of Flamingo stands in a small bight on the west side of the bay. From Flamingo bay the coast trends to the south-west for about 20 miles to Arpour point westward of the north-west point of St. Sebastião. The shore has several indentations, backed by high land, and with the north side of St. Sebastião island forms a deep bay open to the eastward called Barra das Canaveiras.

VITTORIA ISLAND.—At nearly 4 miles eastward of the north-east end of St. Sebastião island is that of Vittoria, $2\frac{1}{4}$ miles east and west and one mile in breadth. Southward of the west end of Vittoria are two small islets or rocks surrounded by a reef which extends about 2 miles S.S.W. from the island. The Busios are two islets, appearing like three at a

* The same officer says, with the small islet south-east of Porcos, bearing N.E., distant one mile, is a rock awash on which the sea breaks heavily; probably these rocks are identical.

† See Plan :—Flamingo Bay or Shark Roads, No. 542, scale, $m = 1.5$ inches.

distance, lying S. by E. $\frac{3}{4}$ E. 10 miles from Porcos island, and north-westward 6 miles from Vittoria. The passage between these islands, except the reef southward of Vittoria, is free from danger. There are 17 fathoms water 25 yards from the Busios.

ST. SEBASTIAO ISLAND, in form quadrilateral, is about 14 miles in extent and its mountains are as high as those of the mainland, from which it is separated by a channel from about one to 3 miles in breadth. The island may be seen in clear weather from a distance of 45 miles; it is nearly covered with wood to its summit, and its shores are steep-to; it has several waterfalls which have a pleasing effect. The eastern side of the island extends nearly north and south, and from the south-east point the southern side runs about W. by N.

Villa nova da Princeza, off which is the usual anchorage, stands on the eastern side of the island at $3\frac{1}{2}$ miles from the north point. The old town of St. Sebastião is on the mainland at $2\frac{1}{2}$ miles to the south-west. The channel of St. Sebastião affords a roomy and safe anchorage for the largest vessels. It runs to the southward along the island side for about 5 miles, when it trends to the south-west. The western side of the channel or that of the mainland, is bordered by a bank, having over it from one to 3 fathoms water. From Arpour point westward of the north-west extreme of the island, the bank extends off about 2 miles and terminates at a point one mile southward of the town of St. Sebastião.

Vessels bound into St. Sebastião channel from the northward, when at half a mile westward of the Armação at the north part of the island, should steer S. by W. $\frac{1}{2}$ W. along the island side at the distance of rather more than half a mile in from 10 to 20 fathoms. Off Villa nova da Princeza the depths are 13 and 14 fathoms, gray sand. The southern channel may also be used if convenient, so that a vessel may leave by either channel according to the wind. The winds at St. Sebastião during the day blow nearly always from N.N.E. or S.S.W., following the direction of the channel, but frequently interrupted by calms. At night the land wind is variable.*

Supplies.—There are several watering places at St. Sebastião; one of the best is between Villa nova da Princeza and the Armação at the north end of the island; the water is good and easily obtained. Cattle, poultry, spirits, and fruit may be procured at a moderate price. On all the coast of the mainland fire-wood is abundant. Fishing is seldom productive, but the fish are of a good quality.

TIDES.—It is high water at St. Sebastião, full and change, at 2h.; springs rise 4 feet. The tides are irregular. The current follows the

* See Plan of San Sebastião Island and Channel, No. 299, scale, $m = 1.0$ inch.

direction of the winds, and within the channel run about three-quarters of a mile an hour, and occasionally $1\frac{3}{4}$ miles an hour.

The COAST.—From the southern entrance of St. Sebastião channel the coast formed by the high land trends to the westward curving to the northward; and at the distance of 48 miles W. $\frac{3}{4}$ S. from Seputuba point, the south-west extremity of St. Sebastião is Moela islet, near the east side of entrance to the port of Santos. In the bay thus formed at $17\frac{1}{2}$ miles from Sebastião point, the west extreme of that island, and $5\frac{3}{4}$ miles from the shore, is Monton de Trigo or Corn Stack island, high, nearly conical, and wooded to the summit. At 2 or 3 miles around it, and at the same distance from the coast the depths are from 12 to 25 fathoms, muddy bottom.*

At the distance of 16 miles S. by E. $\frac{1}{2}$ E. from Monton de Trigo, is a barren group called Alcatrasses or Cormorant isles, the largest of which may be seen from a distance of 30 miles. When bearing E.S.E. it has the form in which painters represent a dolphin with its head to the W.S.W. At 2 miles W.N.W. from the north-east end of the largest islet is another islet, and at the same distance to the north-east are two or three others. These latter islets are low. It is not prudent to approach this group nearer than 4 or 5 miles, as the bottom in the vicinity is stated to be foul and the currents uncertain. From the north-east islet Seputuba point bears N.E. by E. distant 15 miles, and Moela islet W. $\frac{1}{4}$ N. distant 34 miles.

SANTOS HARBOUR is formed on the east by the island of St. Amaro, which is separated from the main by a small river, the Bertioga, navigable for boats; and on the west by the island of Engua Guaçu. The entrance to the Bertioga round the east end of St. Amaro is called Barra de Bertioga. Manduba point, the south end of the island, forms with Taypu point, at nearly 7 miles west of it, the extremes of Santos bay. The bay is about $3\frac{1}{2}$ miles deep, has depths of 4 to 10 fathoms, and on the east side is the principal entrance to the harbour, where vessels may lie sheltered from all winds except those from south-westward.

The bay of Santos is easily known; Taypu point being the westernmost high coast land for some distance, the coast immediately west of it being low and flat to the base of the mountains for about 10 miles inland; while all Santos bay is surrounded by a succession of steep hills of moderate height, broken here and there, chiefly at the north side of the bay, into small low beaches.

The town of Santos stands on the east side of the harbour, on the north side of the island of Engua Guaçu, about 37 miles south-westward of

* Baron Roussin says, muddy bottom was found almost always near elevated land.

São Paulo. It is well built, has two churches, convents, hospitals, and building slips, with a population of about 9,000. Its situation is unhealthy, the country around is low, woody, and frequently deluged with rain. The exports are sugar, rum, tobacco, cotton, rice, hides, &c. In 1857, 68 vessels, amounting to 21,951 tons, entered inwards; and 68 vessels, equal to 22,150 tons, cleared outwards. In the same year, the value of the imports was 518,955 milreis; and the exports, 3,152,612 milreis.*

The entrance to the harbour is commanded by a fort on either side about two cables apart. From Barra fort on the south side the harbour extends eastward about a mile, when it trends to the N.N.W. for $4\frac{1}{2}$ miles to the anchorage off the town. The harbour is narrow, with $4\frac{1}{2}$ to 11 fathoms water, and deepest along the east side. On the eastern shore, close up to the town, is a small fort on a barren rocky point, off which the depth is 18 fathoms.

Supplies.—At Santos all necessary supplies may be procured in abundance, and at moderate prices. Water is purchased, or boats may be sent 5 or 6 miles up the river for it, where there is a deep clear pool of fresh water.

LIGHT.—On Moela (Gizzard) islet, a mile south-east of Manduba point, is a white tower, 40 feet high, which exhibits at the height of 100 feet above high water, a *fixed* white light, which should be seen in clear weather from a distance of 12 miles.

DIRECTIONS.—After passing Moela islet, steer along the land, giving Palmas islet, which is low with a few bushes on it, a berth of one-third of a mile, and haul gradually to the northward and eastward. When the fort is well open, steer with it on the starboard bow, keeping northward of the line of the points, to clear the bank extending along shore from Barra fort to the point south-east of it, the least water will be $4\frac{1}{2}$ fathoms. Pass close to the rocky point under the fort to avoid the spit extending from the low sandy point on the north side, then steer rather on the southern and eastern shore, when a remarkable perpendicular rock on the western shore will be seen above the trees, which steer for, and pass moderately close.

The route will then be towards the fort, from abreast of which steer for the town, giving a berth to the low point east of it, and anchor when abreast of the first landing place in $5\frac{1}{2}$ fathoms water. The tides are strong, particularly the ebb. It is high water, full and change, at 2 h. 50 m. A mud bank extends from the fort point to that of Ilha de Carvalho, narrowing the channel and anchorage.†

* For the value of the milrei, see page 68.

† See Plan:—Santos Harbour, scale $m = 0\cdot5$ of an inch, on Sheet 6, No. 530.

LAGE de SANTOS.—At $16\frac{1}{2}$ miles S. by E. $\frac{1}{4}$ E. from Moela light-house is the Lagé of Santos, a level white islet probably 40 feet high, and E.S.E. of it, distant about 2 miles, is a reef of rocks which appears 6 or 8 feet above the sea. Between it and Santos the depths are from 15 to 22 fathoms, sand, mud, and broken shells.

The COAST.—From Taypu point, the west extreme of Santos bay, the shore trends to the south-west for 25 miles to the village of Conceição. The shore is generally low, backed by a chain of high mountains at the distance of 12 or 15 miles inland, which here and there branch towards the sea, and appear from a distance like islands. At the distance of 12 miles S.S.W. from Taypu point, is a small bank with only 9 feet water on it, lying in the way of vessels from the southward bound into Santos.* Conceição stands on rising ground near the beach, and at 4 or 5 miles from it there are 9 and 11 fathoms water. From hence a low sandy shore continues to the south-west for 14 miles to the heights and creek of Piruibe, where it takes a more southerly turn for about 5 miles to Guaraha point and islets.

From the latter point the shore trends again to the south-west, and at the distance of 16 miles is Jurea point, with the bar of the river Una between. At 7 or 8 miles more to the south-west is the bar of the river Iguape; and about the same distance farther on is the entrance to the Mar Pequeno de Iguape, which admits boats into that sea. The soundings along shore generally increase in depth, according to the height of the land, at from 3 to 10 miles off there are from 7 to 13 fathoms water. Temporary anchorage will be found at any convenient distance from the shore.

LAGE of CONCEIÇÃO.—At 7 miles S.E. by E. from the village of Conceição, and 15 miles northward of the Queimada Grande, is a rocky islet about 16 feet above the sea, which appears a little larger than a vessel's launch. About three-quarters of a mile from it are 12 fathoms water, mud and sand. From this place the port of Santos may be distinctly seen at 21 miles to the north-east.

The QUEIMADA ISLETS lie north-west and south-east of each other, 10 miles distant. The little Queimada, the nearest to, and about 9 miles from the coast, is a small round islet, thickly wooded, and visible at a distance of 20 miles. It is 10 miles S.W. by S. from the Lagé of Conceição. The Queimada Grande is said to be nearly 2 miles in length, N.N.E. and S.S.W., with a reef extending from its northern end. The

* This shoal was reported by the Brazilian steam vessel of war *Don Pedro Segunda*, Mr. John M. Pridham, second master H.M.S. *Rifleman*, 1859.

islet is nearly barren, with its highest part to the south-west appearing round.

VIGIA.—A rock, just awash, in about $25^{\circ} 41' S.$ and $44^{\circ} 48' W.$ or S. by E. nearly 105 miles from the south-east end of St. Sebastião, was stated to have been seen on the 13th February 1811 by a pilot of Bahia named Medeiros.

The **MAR PEQUINO** (little sea) is a narrow lake or channel running parallel with the shore from the bar of Iguape to Cananea bay, a distance of about 30 miles. The town of Iguape stands on the west bank at 4 miles from the entrance; the sea is divided at the south-west part by the island of Cananea, and it has depths of 4 to 6 fathoms. La Praya, or beach of Iguape, the island which forms the sea, is a chain of low sandy downs, interspersed with brushwood, and can be seen only from a short distance. It should therefore be approached with caution, and in foggy weather not nearer than 6 miles in 9 or 11 fathoms water, sandy bottom.

MOUNT CARDOZ, at about 15 miles W.N.W. of the isle of Bom Abrigo, is the highest and most remarkable mountain on this part of the coast; but notwithstanding the proximity and height of the chain of mountains, of which it forms a part, the fogs that sometimes prevail on this part of the coast during the southern monsoon prevent the land from being seen.

CANANEA BAY, at the southern entrance to the Mar Pequino, is formed by an island southward of La Praya or sandy beach of Iguape, and which is separated from the main by a small rivulet called Ararapira. The bay is large and affords well-sheltered anchorage. The islet Bom Abrigo lies at the entrance; it is high, covered with trees, and its two extremes are more elevated than the centre; there are several shoals on which the sea breaks northward of it, at the entrance to the bay, and a smaller islet lies on its south side. At 2 miles eastward of it are 11 and 12 fathoms water, sandy bottom. A town stands about 7 miles westward of Bom Abrigo. Large vessels are built here.

The entrance to the bay will be known by mount Cardoz. The northern channel is generally used, but the southern one is the deepest, and about midway between Bom Abrigo and the shore west of it, is anchorage in $5\frac{1}{2}$ or 6 fathoms water. A pilot into the bay is necessary.

The **COAST** from Cananea point on the south side of entrance to Cananea bay continues low and sandy to the south-west for about 32 miles to the entrance of Paranagua bay. A small islet lies off Cananea point. At about 11 miles from Bom Abrigo islet, and nearly opposite the bar of Ararapira, is Castillo islet, 32 feet above the sea. The islet takes its name from a ridge rising from its centre, which, at a distance, resembles

a castle. At $8\frac{3}{4}$ miles S.W. by S. from Castillo is Figueira ialet, 160 feet high, in the form of a fig. Both these islets are nearly barren. They may be rounded close, and at one mile seaward there are from 10 to 15 fathoms water, on fine sandy bottom.

The water which issues from the bay of Paranagua carries with it alluvial deposits which diminish considerably the depths outside, but not so much as to affect navigation. At 6 miles from the entrances there are from 5 to 8 fathoms water, on gray sand and mud.

PARANAGUA BAY (so called) is a deep inlet or gulf running westward and northward, with the land broken in every direction within a circuit of about 15 miles. It is surrounded by forests, and receives the waters of many small rivers and rivulets. The entrance is sheltered and divided into two channels by Ilha do Mel (honey), a low island on which are several hummocks appearing at a distance of 7 or 8 miles like islets.

Between the island and north point of entrance are three little islets covered with palm trees, named the Palmas, with several rocks extending a mile westward. A shoal also extends to the south-eastward of the islets to a distance of about 3 miles; its extremity is marked by a buoy.

The island of Cotinga, about $5\frac{3}{4}$ miles in length nearly east and west and one mile in breadth, with Raza da Cotinga running parallel to it on its north-eastern part, lie on the south side of the inlet, at about half or three-quarters of a mile from the main, and leaving a space between them and Ilha do Mel of about $1\frac{3}{4}$ miles. An islet lies in the southern entrance and the channel being obstructed by breakers is not navigable.

The north channel carries from 3 to 5 fathoms water, but there is generally a heavy swell, and at times the sea breaks. The general depths in the southern part of the inlet are from $2\frac{3}{4}$ to 10 fathoms, and between Cotinga and the main 2 to $2\frac{3}{4}$ fathoms.

The town of Paranagua stands on the main southward of the west end of Cotinga; and about 8 miles westward on a tongue of land at the head of the inlet is Villa Antonina with $2\frac{3}{4}$ fathoms water close off it.*

DIRECTIONS.—Pilots are always on the look out for vessels requiring them. Great caution is necessary in approaching Ilha do Mel, as a bank extends seaward a considerable distance, and with the north-east part of that island bearing W. by S. distant nearly 6 miles, there are only $3\frac{1}{2}$ fathoms water. Bring the north-east hummock on Ilha do Mel, or the palm trees on Palmas islets which are very remarkable, to bear N.N.W. $\frac{1}{2}$ W. and steer for them, passing the buoy on the extremity of the shoal, on the

* See Plan:—Paranagua, on Sheet 6, No. 530.

winds cause the water to fall, and those from the south and S.E. raise it, in proportion to the force of the wind, from 6 to 9 feet above the main level, which inundates the two banks at the entrance to the river.

DIRECTIONS.—The river San Francisco should be entered with caution, and the sea on the bar should be taken into consideration. When the wind and tide are contrary the sea is heavy even in fine weather, and inside the bar, in from 8 to 12 fathoms water, it is most disturbed. It is therefore always prudent, before entering the river, to wait for change of tide when it is contrary to the wind, when the sea becomes smooth.

Steer in with Cape João Diaz bearing about S. by W., keep the lead going, and when at the distance of 3 miles from the cape, steer West until its east extreme is in line with the morro da Enciada at $2\frac{1}{2}$ miles to the south-west; then keep on this line until a long mile from the cape or the river is well open; but the north point of entrance should not be brought westward of S.W. by W. $\frac{3}{4}$ W. until well inside the cape, in order to avoid a shoal patch with 23 feet water on it, at nearly three-quarters of a mile N.N.W. of the cape. Then keep in mid-channel and the water will gradually deepen to 8 and 11 fathoms; and a vessel will carry the latter depth past a shoal extending seaward from the north point of entrance, and on which the sea breaks heavily.

After passing the point and breakers at a convenient distance, a group of islets will be visible. Steer along the north-west shore with the islets ahead until the town of San Francisco is seen; then steer toward and anchor off it with the church bearing about E.S.E., Cross point N.N.E. $\frac{1}{4}$ E. and a remarkable peak to the right of the town S. by W. $\frac{1}{2}$ W., in 6 fathoms water, muddy bottom.* Care should be taken to avoid a rocky patch just awash lying a little westward of the church about 2 cables from the shore, and also one or two other rocks off the town, which in 1854 were buoyed. A vessel of light draught after crossing the bar should give Cape João Diaz a berth of half a mile.

Vessels working should avoid the detached rock 4 cables north-east of Ovaringa islet, and about one-third of a mile from the north shore, and tack immediately the lead indicates hard bottom. On the south-east side of the channel is a flat called the Corôa Grande, fronting the mouth of the Sacco de Peroba, and which dries at low water. During the sea breeze there is a heavy surf on it, the ebb tide sets towards it, and in working the north shore should be kept aboard.

ANCHORAGE.—A stranger desirous of communicating with the town of San Francisco, and not wishing to cross the bar, will find anchorage between San Francisco and the Graça islets, well sheltered from all winds

* Mr. J. M. Pridham, second master, H.M.S. *Rifleman*, 1854.

but those from the north. The wind seldom blows hard from the northward; but a gale often occurs from S.S.W. or South and veers to S.E. A vessel at anchor near the entrance to San Francisco river would be on a lee shore in a south-east gale, and from the trend of the land unable to obtain an offing; hence the value of this anchorage.

From the northward pass a quarter of a mile inside the northern islets, and steer towards the morro Itamirim, with the other islets broad on the port bow until about half way through; then anchor in 5 or 6 fathoms water, sand, or if convenient more to the northward. From the southward pass between the south islet of the Graça group, lying just northward of the morro da Enciada, and the islet of Paz, the largest of the group next to it. The channel is about a mile in breadth, with 10 fathoms water, shoaling to 5 or 6 fathoms as a vessel advances to the northward.*

On January 4th, 1854, H.M.S. *Bonetta*, being south-eastward of the Graça islets, with her jib boom and main gaff sprung, blowing hard from the southward with a heavy sea, ran inside the islets and anchored in $8\frac{1}{2}$ fathoms water, sand, with the outer rocks bearing S.E. by E. $\frac{1}{2}$ E., and Cape João Diaz W. $\frac{3}{4}$ S. Here she was sheltered and rode out a fresh gale from S.S.E.†

Vessels anchor here to await a favourable opportunity to enter the river; and here a pilot may be obtained.

THE COAST.—At 12 miles south of the Graça islets is another group, called the Tamboretas, at about 2 miles from the shore. At 5 miles S.S.W. of the latter islets are the Remedios islets, lying south-east of the entrance to the Aracary or southern channel of San Francisco, and between 3 and 4 miles to the southward of them is the Lobos Tapilinga group. All these islets are covered with trees, and it is said that small vessels only can pass between them and the shore. From the Aracary the low shore runs to the southward, curving westward for about 23 miles to the bottom of a rather deep bay formed by the low point of Itapacoroya extending to the eastward. About 7 miles southward of the Aracary is the bar of Itapucu.

Pedres islet, 16 feet high, lies about 6 miles N.N.W. $\frac{1}{2}$ W. from Itapacoroya point, and at 3 miles southward of the islet is Feya islet 32 feet high. About a mile north-east of the point is a rock, and close on its south side is another. In the bay on the north side of Itapacoroya point vessels may anchor with southerly and westerly winds. There is an *Armação* here,‡ and water may be obtained. The land all along is high, presenting rugged mountains and valleys, some of which extend to the

* Mr. J. M. Pridham, second master, H.M.S. *Rifleman*, 1854.

† Mr. Wm. Pearse, second master.

‡ *Armação*.—Establishment for preparing whale oil.

seaside ; they are covered with wood, and may be seen at a distance of 45 miles.

The land northward of Santa Catharina island is high, covered with wood, and like that in the neighbourhood of that island appears in irregular mountains and valleys, some of which extend to the seaside, and can be seen at a distance of 45 miles. Between Itapacoroya point and the island about 35 miles southward of it, the shore forms several bays, with small rivers running into them. Tijucas bay, north-west of Santa Catharina, affords good anchorage.

There are several small islets northward of Santa Catharina ; the largest is that of Arvoredo, at the distance of 6 miles ; it is high and wooded, with an islet $1\frac{1}{2}$ miles from its eastern side, and is a good mark for this part of the coast. There is anchorage in the small bay on the south-west side of the island in 11 fathoms water, mud. At 3 miles W.N.W. of Arvoredo, and between it and the north point of Tijucas bay, are the Penedos San Pedro, two rocks with a breaker half a mile S.W. by W. of them ; and about 4 miles northward of them, and nearly the same distance from the shore, is the islet of Pedra de Gale, remarkable by long white streaks on its steep side, as well as by two rocks which lie off its north-east end.

The channels between these islets and rocks are safe, the depths varying from about 8 to 18 fathoms, over oaze and gray sand. At about 15 miles from the coast the depths are from 18 to 24 fathoms, and on the parallel of $26^{\circ} 44' S.$ and long. $48^{\circ} W.$ there is a bank with 12 and 14 fathoms water over it.

ITAPACOROYA BAY, on the north side of the point of the same name, is a safe anchorage, with winds from S.E. round by south to N.W., in about 5 fathoms water, mud bottom, and good holding ground. Small vessels lie sheltered close in to the village, near some piles formerly used when this was a great whaling station. A disagreeable sea sets into the bay with north-east winds. The head of the bay is shallow, and from the village along the beach towards Feyá islet are numerous reefs which do not show with smooth water. Anchorage will also be found on the south-west side of Feyá islet, and rather better than in the bay.*

A dangerous sunken rock, just awash at low water, lies north and south about 31 feet in length, with Itapacoroya point bearing S.S.W. $\frac{1}{2}$ W., a small bluff point about 500 yards north of the point S.W. $\frac{1}{2}$ W., distant one mile, and Feyá islet N.W. b. W. $\frac{1}{2}$ W. There are from $5\frac{1}{2}$ to $7\frac{1}{2}$ fathoms water at the distance of 20 yards around the rock, and between it and the point 6 to 8 fathoms, mud bottom. All kinds of refreshments can be procured at the village.

* Mr. Wm. Pearse, second master, H.M.S. *Bonetta*.

CAMBORIU, like most of the anchorages on this part of the coast, is open to the north-eastward, but sheltered from all other winds ; the bottom is a mixture of sand and mud. The river of the same name is narrow, the bar shallow, and can be crossed only by small coasters. At half a mile from the mouth of the river there are $3\frac{1}{2}$ fathoms water. A dangerous sunken rock, with only 3 feet water on it, lies $1\frac{1}{2}$ cables from Camboriu point, which is a prominent high bluff, with Palm islet in the bay, bearing W.b.N., and Stony point abreast the rock, S.E.b.E. $\frac{3}{4}$ E., with smooth water, and the wind off the land, the sea seldom breaks on it ; there are 5 fathoms water at 15 yards from it, and 7 fathoms between it and the point.

RIVER TAJAHÍ.—The entrance to this river, about 8 miles southward of Itapacoroya point, is formed on the south by a rocky bluff, whilst the north point is low, sandy, and forms a narrow spit over which the sea breaks, and which contracts the entrance. The passage is on the south side, and 3 fathoms is the least water carried in, where a vessel will find smooth water, and sheltered from all winds. The country here is fertile, and a considerable trade is carried on in wood.

GANCHOS BAY.—This small bay, in the south part of that of Tijucas, affords good anchorage, and water, fresh beef, and stock may be procured from the village. It will be easily known, as it lies under the high sugar-loaf peak named mount Ganchos. Small vessels may anchor here in $3\frac{1}{2}$ fathoms water, mud, completely land-locked. In entering or leaving this bay care should be taken to give a good berth to Ganchos point, as a reef of rocks extends half a mile to the northward, on which the sea breaks only at times.

SANTA CATHERINA ISLAND separated by a narrow channel from the mainland, lies nearly north and south about 30 miles in length and at its north end 10 miles in breadth. It is high, with its greatest elevation to the southward, and on approaching from the eastward appears much intersected by deep valleys ; it can be seen from a distance of 45 miles ; but the mountains of the mainland are higher, particularly the morro of Camborella, a branch of the eastern Cordillera.* About its middle on the eastern side near the shore is a lagoon, which has an entrance from the sea ; it separates the mountains and forms a conspicuous opening.

The eastern coast is high, clear of danger, and may be approached at a prudent distance. There are several small islets off it, which may be seen at a distance of 9 miles ; these are the northern Moleques, the Bajejo, and the two Aranhas at the north-west end of the island. Isle

* Cordilheira, the Portuguese term for a chain of mountains, is usually anglicised by Cordillera, adopted from the Spanish.

Xavia, having a flat summit and of moderate height, lies off its middle a little southward of the entrance to the lagoon ; and about 7 miles southward of it is isle Campexe, where anchorage will be found with southerly winds. The southern Moleques are three large white rocks, lying near each other in a north-east and south-west direction ; when seen from the south-east they appear steep and conspicuous. Between these rocks and the Trez Irmaos westward of them, there is a depth of 15 fathoms. A reef of sunken rocks extends nearly a cable's length southward of the latter islets.

The island is fertile, and produces farina, maize, mendioc, &c. for exportation ; and sugar, cotton, coffee, &c., and a variety of fruit for home consumption. Palm trees may be seen in every direction. The climate is considered the most healthy on the seaboard of Brazil ; it has always been remarkably free from epidemics. About four or five hours' ride from the capital are hot springs, the temperature being about 100° Fahrenheit ; they are much frequented by people from various parts of Brazil from November to March, and are considered beneficial in rheumatic complaints, disorders of the viscera, &c.

The whole population may be about 40,000. The town of Nossa Senhora do Destero, the capital, is on the west side of the island about 10 miles southward of fort Santa Cruz at the northern entrance. It stands in a bay on the side of a gradually sloping hill, faces the south-west, and has a pleasing appearance from the anchorage. The streets are narrow and tolerably clean ; most of the buildings are white, and many of them three stories high. Here is a cathedral and two churches. On the west side of the town is a large hospital. The market-place is on the south side of a large square opposite the cathedral, and is well supplied by the market boats from the neighbouring bays. The population of the town is numerous and clean, and all appear to be well employed.

The island has little or no foreign trade, but is visited occasionally by vessels requiring supplies and repairs. If supplies only are required, and a vessel draws 11 feet and upward, she is not required to proceed to the town. Most kind of repairs can be done here. There is good timber of various qualities ; but masts and spars of pine can seldom be obtained. The port and other charges on a vessel of 250 tons, entering with cargo and clearing in ballast, is about 13*l.*, and if clearing with cargo about 6*l.* additional.

The anchorage off the town may be approached either round the north or south end of the island as convenient. Pilots can always be had at the small village near fort Santa Cruz, and mariners visiting the place for the first time will do well to take one.

Supplies.—All kinds of supplies may be obtained at the town of

Nossa Senhora do Destero,—oxen, pigs, poultry, fish, &c. In 1860, fresh beef was $6\frac{1}{2}d.$ and vegetables $2\frac{1}{2}d.$ per pound. There are several watering places; the best water is procured from off the village of San Antonio on the island, where a vessel may anchor in 18 feet water; there is also a stream of excellent water in the little bay south of Anhatomirim islet. Firewood may be obtained by cutting it at no great distance from the beach, but unless the trees are young from which it is procured, it will be prudent to immerse it before it is taken on board.

WINDS.—The ordinary winds in the channel of Santa Catherina follow its direction either from the northward or southward; but they are seldom strong, and the squalls are not dangerous to vessels with good ground tackle. From March to September, being the winter, the winds in the vicinity of the island generally blow from South to W.S.W.; sometimes strong and accompanied with rain, but these do not last more than two or three days.

Towards the month of October the winds draw to the eastward and northward, and the six following months of summer are the hottest in the year; squalls during this time are frequent from North round by east to West, and when during this season the wind is from the south-eastward, it is accompanied by much rain. In general the greatest quantity of rain falls during the months of August and September, but even at this period some years have been exempted.

They have here a proverb, “Pampero a la Missa,” as the S.W. winds set in once a week, and often on the Sunday. There is almost always a fresh breeze blowing from one side or the other of the town.

TIDES.—It is high water at Anhatomirim islet, full and change, at about 2h. 45m.; springs rise 6 feet and neaps 3 feet. The tides are tolerably regular in Santa Catherina channel; they enter from the northward and southward at the same time, and meet in the channel off the town, where they separate and return. The mean strength of the tidal current seldom exceeds a third of a mile an hour at half tide, but at the springs, and a day or two before or after, it sometimes runs $1\frac{1}{2}$ miles. It is, however, somewhat influenced by the wind.

NORTH CHANNEL.—The passage most frequented to the entrance of the north channel is between Rapa point, the north extreme of Santa Catharina, and Arvoredo island N.N.E. of it. It is about 6 miles in breadth, clear of dangers, and either side may be approached to a prudent distance. San José point, about 6 miles S.W. by W. from that of Rapa, is foul and should not be approached nearer than a quarter of a mile. A small rocky patch having one fathom on it also lies off Magalhães point, at the distance of about 3 cables, on the western side of the channel.

The islet of Anhatomirim with fort Santa Cruz separated from the main by a narrow passage, lies West of San José point, and here the channel is from $1\frac{3}{4}$ to $2\frac{1}{4}$ miles in breadth, with depths of $4\frac{1}{2}$ and 5 fathoms; the deepest water is in the middle of the entrance; anchorage will be found as convenient and is everywhere safe, either northward or southward of Anhatomirim, but if the vessel's draught admit a berth will be found in $4\frac{1}{2}$ fathoms water, muddy bottom, at a mile S. $\frac{1}{2}$ E. from the fort, but more shelter will be found rather eastward. Here a vessel will be able to communicate with the village of San Miguel on the main, obtain water from the river of that name in the bay northward of it, and will be in a good position for visiting the town.

The water is always smooth under shelter of the high land; the anchorage is open only to the north-east, but the winds from that quarter are not dangerous. At about $2\frac{3}{4}$ miles southward of Anhatomirim islet is that of Raton Grande, with a fort on its north end, and half a mile farther south is Raton Pequeno. Off Cape Quebra Cabaco on the main, is a rocky flat named Ipatitinga do Norte with 4 feet on it at low water. Cape Henriques to the southward is distinguished by being woody, and near it is a sunken rock. The water off the town is shallow, and at the distance of 4 cables from the shore there are only 6 and 7 feet.

During the highest tides there are never more than 12 feet water over the flats in the channel; the mud, however, is soft for a depth of about 4 feet. No damage will occur from grounding, but considerable delay may take place.

DIRECTIONS.—During northerly winds the land should be made to the northward, and with southerly winds to the southward of the intended channel. A vessel of about 13 feet draught can navigate the north channel for the anchorage of Nossa Senhora do Destero; steer in for the entrance between Rapa point of St. Catherina and the island of Arvoredo, or to the northward of the latter about midway between it and Penedos San Pedro. Having passed Rapa point, continue to the south-westward midway between San José point and Anhatomirim islet; then alter course to about S.S.W., passing $1\frac{1}{2}$ miles westward of the two Raton islets, and when the narrow part of the strait, which is about 2 cables in breadth, and commanded on the east by fort Santa Anna, bears S.S.E., steer for it.

The water deepens to 16 fathoms in the narrows, but shoals again after passing the fort. At nearly 2 cables southward of it is isle Gato or Ratos, on which is the coal depôt, and to which a berth of more than a cable should be given. Anchor a little southward of the islet, with it bearing about N. $\frac{3}{4}$ E., the cathedral N.E. by E., and the centre of isle Vinhas S.E., keeping the south Ratones open of fort Santa Anna, in $3\frac{1}{2}$ to 6 fathoms water.

SOUTH CHANNEL.—The southern entrance to the anchorage of Nossa Senhora dos Desterro is between point dos Naufragados, the south-western extreme of St. Catharina island, and Fort islet, the northernmost of three islets lying S.S.W. of it; the outer islets are the largest and named Papagaios, the southern of which is about $1\frac{1}{2}$ miles from the point. At nearly two-thirds of a mile eastward of point dos Naufragados is that of the Fraylès, and outside it in the same direction are the islets Três Irmaos, the outer one lying about $2\frac{1}{2}$ miles from the latter point. From the Fraylès point a bar, having from 22 to 27 feet on it, stretches across towards the opening of the two Papagaios.

A vessel entering the South channel should have a pilot, a leading wind, a rising tide, and not draw more than 15 feet water. The passage is about $2\frac{1}{2}$ cables in breadth, and when over the bar the water deepens in mid-channel between the lighthouse and Fort islet to 17 fathoms, and shoals again rapidly in proceeding to the northward. Steer in for the lighthouse; the deepest water on the bar is about a cable from Fraylès point; after passing the lighthouse steer to the northward, on the Santa Catharina side, and pass about a cable eastward of Cardos islet, lying rather more than $1\frac{1}{2}$ miles about N. by W. $\frac{1}{2}$ W. from the lighthouse.

If from the southward give the Papagaios islets a berth of about a third of a mile, steer to the north-eastward, haul gradually into the channel, and proceed as before. Having passed Cardos islet steer north-westward for the south point of Brito bay, on the main, and when at the distance of half a mile from the shore, steer to the northward along the western shore, passing Pesqueiro Fondo point at the distance of 4 cables, thus leaving on the western side the village of Enceado do Brito, and farther on that of Cedros.

On the eastern side, on the island of St. Catharina at some distance, is seen the village of Riberao or San Lapa, and to the northward Largo islet. Southward of Largo is a reef of dangerous rocks, which are avoided by keeping the fort of the South bar on with the west point of isle Cardos, until the steeples of the cathedral appear on the western part of Largo islet. From off the latter islet steer about N. $\frac{1}{4}$ W. until an islet, des Cascas, bears West; then proceed towards the steeples of the city and anchor as before directed. A sailing vessel attempting to enter this channel with a scant wind and falling tide will probably be set on Fort islet, or point dos Naufragados.

LIGHT.—On Naufragados point, the south-western extreme of St. Catharina island, is a circular tower which exhibits at an elevation of 149 feet above the sea, a *revolving* white light, attaining its greatest brilliancy every *thirty seconds*, visible about 18 miles.

The COAST.—The land between Santa Catharina and Cape Santa Marta is high and wooded ; the interior mountains seen, are covered with clouds when the wind is from the southward, but clear when the wind is from the north-east ; they can easily be seen at a distance of 36 miles from the coast. At nearly $3\frac{1}{2}$ miles south of the lighthouse on point dos Naufragados, is the high land forming Pinheira point, and at nearly $2\frac{1}{2}$ miles south-east of the latter is Coral islet, about a mile and a half in extent and covered with trees ; it appears round when seen from northward or southward. At about 23 miles to the southward of Pinheira point is that of Bituba, with several small capes between, and about $1\frac{1}{2}$ miles south-eastward of the latter point is Arara islet, and at $1\frac{1}{2}$ miles farther on in the same direction is a high and steep rock named Tocoromi.

From Bituba point, a low flat tongue of land forming a lagoon, runs about S.W. $\frac{1}{2}$ S. for 16 miles to its entrance, at $5\frac{1}{2}$ miles northward of which, and one mile from the shore, is Lobos isle. Vessels of 7 or 8 feet draught can enter the lagoon, and inside, on the south part of the tongue of land, about a mile northward of the bar, is the town of Laguna, which carries on a small trade with Rio de Janeiro. At the north end of the lagoon is the town of Villa Nova or Santa Anna. Cape Santa Marta, at 10 miles southward of the entrance to the lagoon, is the termination of the line of mountains that backs the coast to the northward, and is remarkable by having on its summit several white places, which from a distance appear like a number of houses. The mountains here range to the W.S.W.

From Cape Santa Marta the coast runs to the southward and westward for about 285 miles to the entrance of Rio Grande do Sul. There are no outlying dangers, but the bright white sandy shore is all along extremely low, variegated only by little hills and stunted bushes, and can be seen only in clear weather from aloft at a distance of 7 or 8 miles, and from the deck of a vessel at not more than 3 or 4 miles. The first part of it, as far south as the rio Tamandahy, in about lat. $29^{\circ} 57' S.$, is called the Praya or beach of Torres, and the coast forms an indentation about 16 miles deep.

At 75 miles south-west of the cape is the town of As Torres (The Towers) ; here is a small bay which has been favourably reported on by engineers as a suitable place for the formation of a harbour. At about 2 miles north of the town is the mouth of the river Mampituba. At one mile eastward of the town is a small low islet about a cable in length. The rio Tamandary, at about 40 miles south-west of As Torres, is formed by the connexion of several lakes which overflow into the sea.

The coast southward as far as Capão Redondo or Mostardas point, known by a round thicket, is called the Praya do Fernambuco or Tamandary ; it

runs S.W. then S.S.E., forming a bay in which small vessels sometimes obtain shelter from continued south-westerly winds. The town of Mostardas stands W.N.W., distant about 9 miles from the point, in lat. $31^{\circ} 7' S$. From Capão Redondo to the bar of Rio Grande do Sul the coast is called the Praya do Estreito, the town of that name standing about 28 or 29 miles north-east of the bar of Rio Grande.

The coast is a little more elevated than that northward of As Torres, especially midway between the towns of Mostardas and Estreito, there being more trees, vegetation, and hillocks. Along the whole of this part of the coast houses, villages, and towns, such as Estreito, may occasionally be seen from a vessel northward of the bar of Rio Grande, but these marks can only be seen in clear weather at a distance of about 3 or 4 miles from the shore. The south-east winds blow on it with much force and cause a heavy sea; these winds are preceded by those from the south-west. The coast should be approached only in fine weather.

At 4 miles south of Santa Marta there are 27 fathoms water, over sand, mud and shells; and along the coast to the parallel of $29^{\circ} 20' S$., at 4 to 6 miles distant, the depths are 11 to 23 fathoms. On the parallel of $30^{\circ} S$., at about 62 miles from the shore, the depth is 62 fathoms, sand and mud. The soundings off that part of the coast called Praya do Pernambuco are deeper; on the parallel of $31^{\circ} S$., at 5 miles from the shore, there are 35 fathoms water, and a little to the northward of this parallel, at 60 miles from the shore, there are 84 fathoms, sand and mud. Along the coast of the Praya do Destreito, at 3 to 5 miles from the shore, there are from 9 to 13 fathoms, sandy bottom. In the offing, at 25 to 40 miles south-eastward of it, the depths are about 34 fathoms.

WINDS.—The prevailing winds on the coast of Rio Grande do Sul are the N.E. varying from N.N.E. to E.N.E., and S.W. varying from S.S.W. to W.S.W.; the former blowing chiefly from November to May, and the latter in June, July, and August. The N.E. winds usually continue three to five days, though sometimes they last with little intermission much longer; they generally commence weakly and gradually increase in force; they are often rainy, and succeeded by a calm, and an atmosphere much charged with electricity; when they blow with much force it is a sign of a S.W. wind.

The S.W. winds on the contrary are at the first most violent, commencing usually by a sudden gust; they may last very steadily for two or three days, and have much more force comparatively than the N.E. winds, and usually clear the atmosphere. The East wind occasionally succeeds the N.E., and the South and S.E. follow the S.W. The West and W.N.W. winds are rare, but usually usher in unfavourable weather. The S.E. winds blow with much force and cause a heavy sea.

It may be observed that the indications of the approach of the S.W. winds or Pampero are almost unerring, and can usually be detected from 12 to 36 hours before it comes on; it will occur after a succession of winds from the N.E., and the longer the duration of winds from that quarter the more violent will be the S.W. blast; a calm will usually succeed the N.E. winds, the sky will be cloudy, the atmosphere heavy and charged with electricity, the thermometer will rise, and the barometer fall, and in the horizon from north to west a misty atmosphere will appear, in which much lightning will usually show at night, and in the western and south-western horizon dark clouds will gradually rise, accompanied by thunder and lightning until the wind comes on in its full force.

Several hours before the wind is felt, the water on the bar of Rio Grande do Sul will rise from the accumulation of the sea between the banks at the bar and the coast to the southward, and a ground swell from the southward will be experienced.

THE CURRENT along the coast of Rio Grande do Sul has a tendency to set from north to south, and during the north-east winds it sometimes runs at the rate of 40 miles a day.* There appears to be some doubt as to the current here being wholly regulated by the winds, though it is possible that a continuance of south or south-westerly winds may occasionally check or overcome it from the northward. During south-east winds the sea is always heavy, and then the current sets towards the shore, and several wrecks are believed to have taken place in consequence.

RIO GRANDE do SUL, the most southern province of Brazil, bounded on the north by the Curitiba and the province of Santa Catharina, and south by that of Uruguay, is about 385 miles in length, and may have an average of 220 miles in breadth, containing an area of 85,240 English square miles, with a population in 1856 of 201,300. It consists chiefly of large plains covered with herds of cattle, and some mountain ridges traverse it in various directions, but none of them of any great height. Several large rivers have their source in this province, of which the Uruguay, the Jacuhy, and the Camapuam are the most important.

This extent of land with its alluvial soil has some lakes of large dimensions, of which the Lagoa dos Patos, near the coast and the largest in Brazil, is about 130 miles in length in a north-east and south-west direction, and 40 miles in breadth. This lake receives nearly all the streams which irrigate the northern and eastern portions of the country, and its water continues fresh as far south as the island dos Marinheiros near the towns of São José do Norte and Rio Grande do Sul.

* Proved in H.M.S. *Indefatigable*, January 1856.

It is shallow, but by means of buoys and stakes is navigable for small vessels, of which a large number are employed. Porto Alegre, the seat of government of the province, and containing a population of 15,000 inhabitants principally Germans, is situated at about 100 miles northward of the town of São José do Norte; its trade is yearly increasing, and from the anchorage at the latter place, the port of entry, there is a channel through the lake for vessels of 9-feet draught; the principal difficulty is a bar in the southern part of it.* The exports of Port Alegre are chiefly hides and tallow; but quantities of grain are exported from San Leopold, which has a population of between 6 and 7,000 also principally Germans.

The climate of the province is mild and healthy, the greater part of the soil is fertile, and produces various kinds of grain and many of the fruits of Europe; the country has been styled the granary of Brazil. Timber is not very abundant, but of good quality. Among the minerals are gold, silver, iron, sulphur, and porcelain clay. The rearing of cattle, however, is what chiefly distinguishes the country, and gives employment to its inhabitants, an athletic and robust people. Horses and mules are bred to a great extent, and are highly valued for the excellence of their breed.

The town of Rio Grande is built on the north side of a low peninsula not more than 3 or 4 feet above the water; it is of some extent, containing in 1863 about 12,000 inhabitants, of whom a large number are Portuguese and Germans; its extremely low situation subjects it to occasional floods. São José do Norte stands about $2\frac{1}{2}$ miles E.N.E. of it on the eastern side of the river; the ports are quite distinct, and for many years had separate custom-houses. Shipowners and merchants, when preparing charter-parties, &c. for Rio Grande, should hold in view the distinction between the two ports; and the term "Rio Grande do Norte," should never be used to designate the town or anchorage of São José do Norte, as the former term would apply to that place in the north of Brazil. The custom-house of the latter place is now merged in that of Rio Grande do Sul, a collectoria or establishment for the collection of taxes being left at São José.†

Vessels with cargoes wholly of salt or coals are allowed to discharge all their cargoes at the anchorage of São José, which is much better than what is called the southern anchorage; but vessels with general cargoes are required to discharge at Rio Grande, being allowed to unload a portion of their cargo at São José to lighten to a sufficient draught, so as to navigate the 9 feet channel to Rio Grande, the cargo thus discharged being sent to Rio Grande in lighters; and consequently, vessels above

* The mariner will find much useful information in the British Shipmasters' Handbook for Rio Grande do Sul, by the Hon. H. P. Vereker, LL.D.

† See Plan :—Rio Grande do Sul, No. 2,002, scale, $m = 2\cdot2$ inches.

9 feet draught when loading, have to complete their cargoes at São José. A dredging vessel is, however, now clearing the channel at the rate of one hundred tons a day. Vessels of about 400 tons are hove down a little above the custom house. Water is obtained at 9s. a ton, but not very good ; it is brought off in casks by shore boats.

The principal articles imported are salt, coal, wine, spirits, flour, oil, lard, candles, and manufactured goods ; and the exports consist of different kinds of hides, dry and salted, horns, bones and bone ash, xarque (dried beef), wool, hair, agate, pebbles, &c. The number of vessels entered inwards from foreign countries in 1856-57 was 467, amounting to 35,966 tons ; and the number cleared outwards was 281, amounting to 36,913 tons. In the same year about 30,000 tons of shipping entered inwards from the coasting trade,* and nearly the same quantity cleared outwards.

The value of the imports was 5,812,660 milreis, and that of the exports 6,870,024 milreis. The value of cargoes of British vessels entered inwards in 1857 was 194,681*l.*, and of those cleared outwards 239,277*l.*; but a calculation of the British capital engaged, directly and indirectly, in the trade of this port during the same year shows that it exceeded 1,000,000*l.* sterling.

The port of Rio Grande do Sul may be considered to be comprised in the space from the bar on the south to about half a mile northward of the town of São José do Norte on the north, at a distance of 6 miles from the lighthouse, and as far westward as the anchorage of Rio Grande or San Pedro do Sul. It is commanded at the entrance by a battery of twelve 24-pounder guns at about half a mile southward of the lighthouse. Within the above space there are four different anchorages ; that west of the lighthouse about $3\frac{1}{2}$ miles inside the bar, is good holding ground in 5 to 7 fathoms water, over sand and mud ; here all vessels remain after entering the port until they have been visited, &c.

The second place is near a large red buoy at the confluence of the channels which run respectively to the town of Rio Grande and to that of São José. Vessels which have not a fair wind for Rio Grande usually anchor here in from $2\frac{1}{2}$ to 5 fathoms water, the bottom being mostly mud, but the anchors occasionally drag. The anchorage at São José is capable of accommodating a large number of vessels in from 5 to 7 fathoms water on sand and mud, good holding ground, and well sheltered from all winds excepting the S.W. The anchorage of Rio Grande is sheltered from all winds excepting those from the N.E., but vessels occasionally drag their anchors. Vessels are not allowed to anchor between

* Foreigners are excluded from this trade.

the bar and the extreme point of the coast northward of it unless on extraordinary occasions ; this space is called the Lagomar.

The channel from the anchorage inside the bar to that of São José do Norte is regular, and bounded on either side by low sandy land ; the hillocks on the western side varying from 30 to 80 feet in height, which terminate at about two-thirds up the channel from the bar, at Mangueira point, where there is a flagstaff, which communicates with Rio Grande. Here the Mangueira or Armlet, a shallow bay, runs some distance to the westward ; its entrance is about half a mile wide, and its northern boundary is the low peninsula, on the north side of which, at $1\frac{1}{2}$ miles from Mangueira point, is the town of Rio Grande do Sul.

From the extreme of the peninsula a shallow sandy flat extends to the eastward for about three-quarters of a mile, and forms the western side of the channel or canal leading to Rio Grande, which at the entrance is marked by a black buoy. To the northward of Rio Grande are two low swampy islets rising from an extensive flat ; the latter extends to the south-eastward into the main channel round the flat from the peninsula, and forms the eastern and northern boundary of the channel to Rio Grande.

The shore on the eastern side of the main channel is bordered by an extensive shallow flat, which runs nearly north, and at $1\frac{3}{4}$ miles northward of the lighthouse extends westward more than a mile, when it trends to the north-eastward, and terminates at the commencement of the sandhills, southward of São José, which are from 30 to 90 feet high.

The BAR.—The banks surrounding the bar at the entrance to Rio Grande do Sul are composed of fine sand, and extend from the points of entrance to the southward for about $1\frac{3}{4}$ and $2\frac{1}{4}$ miles, and upwards of 3 miles from the lighthouse ; they are continually changing their position, and therefore no stranger should cross the bar without a pilot. It is indicated by the breakers on either side, has in general a little more than 11 feet water over it, and a large number of vessels in crossing touch the ground, but without receiving further damage.* The bar at present is barely a cable across, and lies S.S.E. from the lighthouse.

When the position of the banks remain unchanged for a sufficient period the upper part becomes compact and hard, forming as it were an incrustation over the under part, which is more yielding, very often consisting of quicksands ; thus when a vessel strikes, the effect will be as though she had struck upon a rock, only that the sandbanks are more elastic. Vessels often rebound, sometimes to a worse position, sometimes passing the danger (as happens on the bar), and occasionally are carried back out of danger.

* A dredging machine is in course of preparation with a view of deepening the water.

If the stranded vessel should break the surface of the bank she will soon become embedded in the sand, an accumulation occurring at the sides, from which the breakers rebound, thus making it often difficult to assist efficiently, or even approach a vessel in danger. The vessel, if embedded and laden with a heavy cargo, will usually sink into the sands until it may be said to be swallowed up.*

Should a vessel get aground on the banks anchors should be immediately laid out in such a direction in which the vessel is most likely to float off, taking into consideration the wind and current; and having hove taut the cables, the vessel should then be lightened, and the assistance of a pilot and steam-tug be obtained; every moment's delay will be of the utmost importance. No opportunity should be lost in crossing the bar, and vessels should not draw more than 11 feet water; with that draught they are often detained more than a fortnight.

The highest water is caused by the pamperos or south-west winds, when vessels may cross the bar at its commencement, if prepared to take advantage of it; but if the wind should be strong it soon causes a heavy sea on the bar, when they cannot enter; and should it veer to the south-east (which it sometimes does), and blow hard, the water on the coast being shallow the sea rises quickly, and it becomes dangerous for deep-laden vessels, consequently many are lost in the neighbourhood of the port. It is advisable for vessels of 10 feet draught to have a steam-tug, unless a fair wind with a good breeze. In leaving the port vessels should not draw more than $10\frac{1}{2}$ feet; with that draught they are often detained more than a fortnight.†

There is a channel carrying 4 feet water between the south-west bank and the western point of entrance to Rio Grande, available for boats, and convenient in giving assistance to vessels in distress about the south-west banks. Pilot boats when caught to leeward use this channel. There is also a channel having 9 feet in it northward of the bar. The anchorage in fine weather outside is $1\frac{1}{2}$ miles south-east of the bar, in 7 fathoms water, sand and mud, with the lighthouse bearing about N.N.W., distant $4\frac{1}{2}$ miles.

Buoys.—The channel immediately inside the bar is marked by buoys. The outer buoy on the S.W. bank is painted black and red, and three

* The *Helianthus*, laden with coals, in 1854 was wrecked on the tail of the south-west bank. The Hon. H. P. Vereker, British Vice-Consul, on several occasions attempted to board, but the weather being unfavourable the vessel could not be approached, and she was abandoned with her ensign flying and rigging complete; and each day it could be observed that she had sunk farther into the sand, until the masts sunk below the level of the sea.

† In March, April, and May 1862, vessels drawing 11 to $11\frac{1}{2}$ feet water were waiting sixty days for an opportunity to go to sea.

black buoys lie to the north-west of it; they are all surmounted by a staff and ball, and are on the south-west side of the channel. The outer buoy on the S.E. bank is painted black and white, and within it is a white buoy, both having a staff and ball; three red buoys lie to the north-westward, the two outer of which are surmounted by a staff and cage. These latter buoys mark the north-east side of the channel.*

LIGHT.—At the north point of entrance to Rio Grande do Sul, about $\frac{1}{2}$ miles within the extremity of the point, is an iron circular tower 101 feet high from base to vane, painted a reddishumber, and exhibits at 50 feet above the sea a revolving white light attaining its greatest brilliancy every two minutes, visible 14 miles. It stands on the sand about 3 feet above the sea, 92 yards N.N.W. of the old lighthouse, near the watch tower, which is square, whitewashed, and has a large and small flagstaff on it; the former has a yard across.

SIGNALS.—When within signal distance of the watch tower, the vessel should hoist the signal of her draught of water, and for this purpose she should be prepared with a red flag, a white flag, a blue flag, and a blue burgee or pendant. The signal should be hoisted so as to be clearly seen from the watch tower, and in order to prevent mistakes, no other signals if possible should be made at the same time.

The signal to approach the bar, is a red flag hoisted at the large flagstaff of the watch tower, and will be always hoisted when the bar is practicable; but it must be understood, that those vessels who are to comply with it whose draught of water may be equal to or less than that indicated at the same time by the signal exhibited from the smaller flagstaff of the watch tower.

When the signals are hauled down from the watch tower or pilot boat stationed at the bar, vessels cannot enter, and they should immediately stand off. From want of attention to the signals, the red flag is often hauled down, in consequence of one or more vessels running too large; thus obliging all to haul off, some losing their chance of getting in through the neglect of others.

The following signals are hoisted at the small flagstaff of the watch tower, and at the pilot boat at the bar, to indicate the depth of water, and also on board the vessels entering or leaving the port, to indicate their draught of water.

Signal	Meaning
A white flag	2 feet 2 inches or less draft
A blue flag	3 feet 6 inches or less draft
A red flag	4 feet 6 inches or less draft

* As these buoys have no lights, other vessels than those which are in the channel should not be relied on.

SIGNALS.			SIGNIFICATIONS.		
A white flag over a blue one	-	-	8 feet 4 inches	on the bar, or vessels' draught.	
A blue flag over a white one	-	-	8 "	9 "	" "
A white flag over a red one	-	-	9 "	2 "	" "
A red flag over a white one	-	-	9 "	6 "	" "
A blue flag over a red one	-	-	9 "	10 "	" "
A red flag over a blue one	-	-	10 "	2 "	" "
A blue burgee over a white flag	-	-	10 "	7 "	" "
A white flag over a blue burgee	-	-	10 "	11 "	" "
A blue burgee over a blue flag	-	-	11 "	3 "	" "
A blue flag over a blue burgee	-	-	11 "	8 "	" "
A blue burgee over a red flag	-	-	12 "	0 "	" "
A red flag over a blue burgee	-	-	12 "	4 "	" "
A blue burgee over a white flag, with a blue flag under.	-	-	12 "	9 "	" "
A blue flag over a white flag, with a blue burgee under.	-	-	13 "	2 "	" "
A blue burgee over a white flag, with a red flag under.	-	-	13 "	6 "	" "
A red flag over a white flag, with a blue burgee under.	-	-	13 "	10 "	" "
A blue burgee over a blue flag, with a red flag under.	-	-	14 "	2 "	" "
A red flag over a blue flag, with a blue burgee under.	-	-	14 "	7 "	" "

When, for want of a favourable wind, vessels inward or outward bound can only proceed by towage, a white flag with red swallow-tails will be hoisted above the signal indicating the number of feet on the bar ; which will be repeated by the pilot vessel stationed there.

The signal for a steam tug is the national flag hoisted at the fore over the flags for the draught of water.*

If a vessel requires assistance, the flag of its nation should be hoisted half mast high. If provisions are required, her distinguishing flag should be hoisted under the national flag. If water is required, the distinguishing flag should be hoisted over the national flag. If an anchor and cable is required, the distinguishing flag should be hoisted at the peak.

For vessels at the bar anchorage about to leave the port, the depth of water will be shown by signal from the flagstaff close to the pilotage wharf ; and whenever this depth is that required for a vessel ready to sail, the signal of her draught should be hoisted and retained whilst there is any probability of her being able to proceed to sea ; having been visited by the bar master, they are at liberty to proceed. They should be ready to sail on the shortest notice, as a delay of a quarter of an hour, together with the time required to be at the bar, may for weeks deprive a vessel of the chance of getting out. The pilots do not always go on board, but

* The charge for towing in over the bar in 1862 was 800 reis per ton (Brazilian) ; but if taken in tow more than 2 miles from the bar, which is optional, 1,000 reis per ton, if more than 4 miles 1,200 reis per ton. For towing out 640 reis per ton ; but if the vessel was not towed in 800 reis per ton. A vessel is not charged for more than 250 tons. The Brazilian measurement is from 35 to 40 per cent. more than British.

keep ahead in their boats and direct the course of the vessel by waving the flag. The red flag on the tower only refers to vessels outside the bar.

There is a telegraph by flags between the village at the bar and the town of Rio Grande, by which a communication may be made by vessels at the anchorage west of the lighthouse or those coming in, through the pilot, with the consul or a vessel's consignee. The signals are exhibited from staffs one near the wharf, in front of the lighthouse, called the pilot-age wharf; the second on the west side of the river; and the third on the theatre at Rio Grande.

The following signals are made from the yard of the large mast of the watch tower, to vessels outside the bar, by blue pendants and blue balls; which are answered by dipping twice, the national flag.

SIGNALS.	SIGNIFICATION.
A ball at left yard-arm - - -	Vessel is too close to the bar.
A pendant - - -	Work to windward, as you are to leeward of the bar.
Two balls - - -	Vessel is too far to windward.
Two pendants - - -	Stand out to sea, as you are too near the coast.
A ball over a pendant - - -	Stand out to sea, as you are too near the shoals.
A pendant over a ball - - -	Stand out to sea, as the wind threatens from south-eastward.
A ball over two pendants - - -	If you keep on this tack you will run aground.
A ball between two pendants - - -	Anchor northward of the bar, at a sufficient distance from the shore.
A ball at each yard-arm - - -	Anchor southward of the bar in 6 to 8 fathoms.
A ball at left yard-arm, and a pendant at right yard-arm.	Carry more sail, so as to be enabled to enter.
A ball at left yard-arm, and two pendants at the right yard-arm.	The signal to close is for those vessels only whose draught of water is indicated from the watch tower.
A ball at left yard-arm, and a ball over a pendant at right yard-arm.	It is not possible to enter now, the state of the bar does not permit it.
A ball at left yard-arm, and a pendant over a ball at right yard-arm.	You can only enter at present by towage.
A ball at left yard-arm, and a ball over two pendants at right yard-arm.	You cannot enter at present, as the wind is light, and there is a strong current.
A ball at left yard-arm, and a ball between two pendants at right yard-arm.	The assistance you request is being prepared.
A pendant at left yard-arm, and a pendant at right yard-arm.	Approach the bar, as the pilot-boat is there, or the steamer is about to come out.
Two balls at left yard-arm, and a pendant at right yard-arm.	Navigate so as to approach the boat which is to go out with the succour you have requested.
A pendant at left yard-arm, and a ball over a pendant at right yard-arm.	The vessel which requires a pilot is to navigate towards the boat coming out.
A pendant at left yard-arm, and a pendant over a ball at right yard-arm.	Observe attentively the signals of the watch tower, as the pilot-boat cannot go to the bar.
Two balls at left yard-arm, and two pendants at right yard-arm.	As soon as darkness comes on, be guided by the lights of the pilot-boats which are at the bar.

SIGNALS.

A ball over a pendant at left yard-arm, and a ball over a pendant at right yard-arm.
 A pendant over a ball at left yard-arm, and a pendant over a ball at right yard-arm.
 A ball over a pendant at left yard-arm, and a pendant over a ball at right yard-arm.

SIGNIFICATIONS.

There is not at present a tug-steamer at the bar.
 The tug-steamer cannot go out at present.
 Deliver to the steamer or pilot-boat the mails, correspondence, or notices which you bring.

PILOTS.—The signal for a pilot is the vessel's national flag under the signal of her draught of water at the fore ; the pilots do not always go on board, but direct the vessel by the waving of a flag. Mariners crossing the bar of Rio Grande for the first time should employ a pilot, and when moving the vessel from São José to Rio Grande, or *vice versâ* ; the expense is not large, and all difficulty and responsibility will be removed.

TIDES.—The tides in the harbour sometimes run strong, but irregular as to time, their direction and velocity appear to be entirely governed by the wind ; the highest water occurs immediately before and during the continuance of south-westerly winds, which blow occasionally, generally lasting two or three days. A current of about 3 knots runs out of the river during the ebb, and carries the discoloured water some distance beyond the bar. The greatest ordinary rise is $1\frac{1}{2}$ to 2 feet.

DIRECTIONS.—During north-easterly winds, a vessel should approach the bar of Rio Grande do Sul from that quarter, make due allowance for a strong southerly set, and go no farther south than lat. 32° S. until her position is ascertained. As the soundings extend some distance from the coast the usual precautions should be taken with the lead, and in running to the southward close the coast a little northward of the lighthouse which is the most conspicuous object, and with the shipping inside the bar in all probability will be the first seen.

Do not haul too close inshore, but keep in more than $6\frac{1}{2}$ fathoms water in order to clear the banks forming the bar, until the lighthouse bears about N.N.W., the outer edge of the south-east bank being steep-to ; but no vessel can cross the bar under sail unless the wind is well to the eastward so as to enable her to steer clean full about N.N.E. When the wind is from the south-westward the lighthouse should be made from the southward, and in coming from that quarter keep in not less than 6 or 7 fathoms water.

Unless the weather is unusually fine, the sea breaks now and then in 11 feet on the bar, and as it is frequently changing its position, a stranger should not attempt to cross it without a pilot, but in case of necessity or in vessels of light draught, the following directions should be attended to. Having sighted the lighthouse, hoist the signal of the vessel's draught of water, so as to be clearly seen, when on being repeated from the small

staff on the watch tower and the signal made to close, the red flag hoisted at the tall staff, steer towards the lighthouse for the opening between the breakers.

On approaching, the pilot boat at her station a short distance inside the bar will be observed, when steer directly toward her, observing her signal of the depth of water on the bar, which will be repeated by the watch tower. Should the signal shown indicate a depth of water equal or more than the vessel's draught, she may confidently proceed on; but if the signal of the depth of water exhibited from the pilot boat or watch tower or the red flag at the large staff on the latter be hauled down, the vessel should immediately stand seaward, off and on, or anchor for a more favourable opportunity.

On approaching the pilot boat a red flag will be waved from her in the direction the vessel is to steer; when held upright steer directly towards her. There is occasionally another pilot boat stationed in the inlet between the bar and the anchorage west of the lighthouse, which also directs the course of the vessel with a moveable red flag. If the second boat should be in her station the vessel will be guided by its signals, immediately after passing the first pilot boat; but, if it should not be there she may act according to the signals of the first pilot boat.

If neither of the pilot boats are in their stations, and the red flag from the watch tower, the signal to approach, continues to fly, the vessel should act wholly on the signals from the watch tower, where on extraordinary occasions a red flag may be shown to guide vessels, as shown from the pilot boats. When over the bar steer to the northward between the black and white buoy on the starboard hand, and the black and red buoy on the port hand; and then keep all the black buoys on the port hand. When well inside the bar the water deepens rapidly, the channel widens, and the bank on either side shows distinctly; the course of the channel is about N.W. by N. trending to the northward as the vessel advances to the anchorage west of the lighthouse.

In proceeding up the channel keep along the western shore where it is steep-to, particularly abreast the sandhills; when abreast Mangueira point steer towards the sandhills with a remarkable tall house amongst the trees a little on the starboard bow, and keep along the eastern shore, keeping the red buoy on the flats extending from the westward, on the port side, and anchor where convenient off São José.

The channel to Rio Grande is narrow, circuitous, and carries from 9 to 20 feet, the former depth is in the bend of the channel; caution is required in taking it, for if a vessel grounds when the water is high considerable delay and expense may ensue. A vessel should have a fair

wind or a steam tug.* The Brazilian vessels are moored to the westward of the custom-house wharf, and foreign vessels to the eastward, and secured head and stern.

THE COAST of Albardaõ, which may be assumed to extend from the bar of Rio Grande to the embouchure of the river Chuy, consists of a narrow strip of land forming a boundary between the sea and lake Mirim with some smaller inland lakes; it is flat all along and from the bar of Rio Grande to Cape Castillos the water is shallow, having midway at about 17 miles from the shore only 10 fathoms, and in the latitude of the entrance to the Chuy at 34 miles from the shore the same depth will be found. Several vessels of 10 feet draught have navigated close along this shore. Vessels of large draught should not, however, approach it too close.†

The first remarkable object southward of the entrance to the Chuy, is a rocky point with a few isolated and partly submerged rocks off it, named Castillos Pequeños or the Small castles; it forms the northern extremity of Castillos bay, the flat sandy shore of which curves to the southward, and at the distance of about 27 miles is Cape Castillos. At about 8 miles northward of the cape are two hills (Los dos Hermanos) in an east and west direction.

* In 1862, the cost of a steam tug for this channel was 400 reis per ton.

† Caution.—The coast of Albardaõ, which comprises more than 120 miles, frequented by ill-disposed men, in the greatest part wanderers, and intimately connected with the natives of the Oriental State who inhabit the neighbourhood of the Chuy as far as Castillos, and are known by the name of "Montoneros." These men commonly flock to the shores of the sea whenever they nourish hopes of plunder, and thus is explained the general cognizance of the fact without the possibility of coming to the knowledge of who are its authors. This simple description of the place is sufficient to show the great difficulties attending the discovery of the depredators of goods saved. *Report of the 10th of May 1862, of the chief of police to the President of the province of Rio Grande do Sul.*

But the few inhabitants strewed over this vast desert, in order not to be discovered and punished, used to convey into the interior everything which they could pilfer. *Official report of the 3rd of July 1861.*

CHAPTER V.

RIO DE LA PLATA.

VARIATION, 8° 15' East to 10° 55' East in 1864.

THE Rio de la Plata, discovered by Juan Diaz de Solis in 1515, is a large estuary at the confluence of the rivers Parana and Uruguay. It is about 165 miles in length in a W.N.W. and E.N.E. direction, and its breadth at the entrance, between Punta del Este on the north and Cape San Antonio on the south, is 120 miles, but it suddenly narrows, as at Monte Video it is only 50 miles wide, between Colonia and Buenos Ayres 27 miles, and 38 miles above at the mouth of the Uruguay and the Boca de Guazu little more than 4 miles. It is a remarkably shallow flat estuary, and above Monte Video two-thirds of it are blocked up by shoals with less than 12 feet water over them.*

The bed of the river rises or shoals gradually from its confluence to the sea, except between the banks, where the bottom is generally composed of oaze, and sometimes of hard clay, called tosca, which extends eastward to the meridian of Monte Video. From thence outwards and southward to Cape San Antonio the bottom is oaze and sand, sand, sand and shells, or sand and gravel, except near the northern shore, and near San Borombon bay, where it is soft mud. The average depth at its entrance is about 10 fathoms, and between Monte Video and Buenos Ayres it may be $3\frac{1}{2}$ fathoms.

The whole southern shore is bordered by a bank; the 3-fathoms line of soundings extending northward of Cape San Antonio to a distance of 10 miles, then curving round the bay of San Borombon, passing 12 miles south-east of Piedras point, and along the coast at a distance of 7 to 3 miles, thus forming the southern boundary of the channel. The English and Archimedes banks occupying a large space in the fairway of the entrance, and the extensive bank called the Ortiz stretching southward from the north shore, with that of the Chico bank on its south-west side, are the great impediments to the navigation of this large and important inlet.

On account of the large body of water brought down by the rivers, which drain an area of about 1,200,000 English square miles, and the

* See Admiralty Chart: Rio de la Plata, No. 2544, scale, $m = 0.2$ of an inch.

general movement of the waters being greatly influenced by the wind, the currents are variable and strong. In light winds and fine weather, the tides are generally regular, but the mouth of the estuary being wide and shallow, the water flows easily in when the wind is from seaward, and is forced rapidly out when the wind is off the land.

The water continues fresh as far down as the river Santa Lucia, 15 miles above Monte Video, on the north, and Piedras point on the south, when it becomes brackish. It is long in mingling with that of the sea, which does its share in at a distance of 75 miles from the mouth of the river. Vessels of large draught may navigate as far as Monte Video, and those of 17 feet draught at Buenos Ayres and the Isles of Hornos north-west of Colonia. Small vessels enter the inner road of Buenos Ayres to within about half a mile of the town.

CAPE CASTILLO.—We begin the description of the north shore of La Plata at Cape Castillo, as it is the most northerly point that a ship should sight if from the state of the weather or the position of the vessel it should be thought prudent to make the land before running up to Lobos Islet. This cape is easily distinguished by the white rounded sand-hill at its back and the black islets which lie off it; and in case of need fair shelter may be found against south-west winds, if it comes on a blow land after having made the land, and a vessel does not wish to keep to sea.

At the end of the white sandy dune which forms the southern limit of the coast of Brazil is a rocky point which trends slightly to the north, after which the shore stretches for a mile to the south-east and forms another rocky point; the former is Cape Castillo, the latter point Coronilla.

The **CERRO de BUENA VISTA** rises to a height of 184 feet above the sea midway between the above two points, close to the shore; it is a round sand-hill, with its summit towards the north-west ending in a sandy peak. There are patches of black bushes on its white sides, and its isolation and peculiar form render it a good mark for this part of the coast. It may be seen in clear weather at about 15 miles off, and the vessel will then be in from 15 to 20 fathoms water.

CASTILLO GRANDE or MARCOS, an islet at about $1\frac{1}{2}$ miles to the eastward, derives its name from a steep black rock like a castle, which stands up on its south-eastern side 135 feet above the sea. From a few miles in the offing this rock looks like a vessel under sail, or if seen against the coast it is well defined on the white sand-hill of Buena Vista behind it. The islet is nearly circular, and about 300 yards in diameter.

CASTILLO CHICO or **ISLA de TIERRA** is a smaller islet lying to the westward of the former; it is not so steep, and is separated from the coast by a passage 160 yards wide and 20 feet deep. The islet is about 40 feet high, and its top covered with bushes. In fine weather a boat can land on the south-west side, where is a small creek. In the channel between the two Castillo islets there is a depth of from 8 to 9 fathoms, sand and mud; vessels of any size may pass through without difficulty.

CASTILLOS BAY.—From Cape Castillos the coast to the north-west forms a small sandy bay, where boats may land. The shore continues low to the northward for a distance of $1\frac{1}{2}$ miles, where the Laguna de Castillos has its outlet.

ANCHORAGES.—In the Ensenada, or bay of Castillo, vessels of any size may find shelter from all winds from S.E. round by the south to N.W. The best anchorage is with the summit of Buena Vista bearing about S.S.W. $\frac{1}{2}$ W., at 3 or 4 cables from the point, in a depth of 4 fathoms, fine sand. Before dropping the anchor it is necessary to be sure of the nature of the bottom, as patches of rock are scattered about. There is tolerably good anchorage also in 3 fathoms water, fine sand, in the centre of the bay formed by Cape Castillos to the west, and the islet Castillo Chico to the S.E.; here a vessel would lie at 2 cables from the nearest land; and in case of its coming on to blow from the N.E. a vessel could get out between the islet and Coronilla point.

These anchorages, which were formerly much frequented, are now completely forgotten. It is useful, however, to recall their existence to the mariner. Many a vessel disabled by a pampero at the embouchure of the La Plata has been obliged to bear up for Santa Catharina or Rio de Janeiro to repair damages; others have been driven off a long way to sea, whereas had they known of these anchorages close at hand they might have run for them. Vessels, however, should be on the watch for the wind shifting to the N.E., when they should put to sea immediately, as that wind raises a heavy sea on this coast.

In the angle of the bay at the very foot of the Cerro there is a small stream where boats can get fresh water easily. There is no fuel but the brushwood on the hill. From the top of the Cerro are seen towards the interior cultivated and inhabited plains, but the coast is a desert.*

CAPE POLONIO lies $2\frac{3}{4}$ miles to the southward of Coronilla point, the intervening coast being sandy downs from 12 to 18 feet high. The cape is a steep rocky promontory forming three points; that to the south-east being

* See Plan :—Anchorages of Polonio, and Castillos, scale, $m = 1\cdot4$ inches, on Chart of Rio de la Plata, No. 2,544.

named Polonio; above it is a greenish cone-shaped hill, rising about 120 feet above the sea, which seen from the S.W. or N.E. assumes the appearance of an island. In the bay between capes Castillos and Polonio there is anchorage with off-shore winds in a depth of 4 or $4\frac{1}{2}$ fathoms at half a mile and in 7 or 8 fathoms at one mile from the shore: fine or muddy sand.

THE ISLAS de TORRES are a group of three islets which extend one mile to the eastward of Cape Polonio: they are sand rocks from 100 to 150 yards in diameter and from 12 to 15 feet high. The two inner are named Nana and Picanada, and are surrounded by a reef the thick named Pelota, 100 to 150 yards S.N.E. from the cape, and at a cable to the N.E. is a low, rounded rock generally above water. The group of islets has passages between them known to the coasters, but strangers should not venture to use them. A dangerous reef barely visible, named the *Playa*, lies 100 yards to the west of Nana.

The two outer islets are distant 10 miles to the east of the inner. These three rocks, as well as the Cape on the north, are formed of sand, and the only anchorage near being the most dangerous and the shallowest of the coast, the sea, which are named by the government as *Mar de Toros*.

THE POLONIO REEF is a long narrow sand bank 2 miles S.S.W. from the cape and runs in from a Spanish rock that was lost at 10 fathoms. The reef extends 10 miles to the S.W. and S.S.W. direction, and the east water depth is 10 fathoms, while the sand bank is from 10 to 15 fathoms. The channel was a continuation of the reef from the coast, and the sea almost always is shallow at low tide. The reef is about 10 miles long, and the water depth is 10 fathoms. The reef is a continuation of the reef from the coast, and the sea almost always is shallow at low tide. The reef is about 10 miles long, and the water depth is 10 fathoms.

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as shown by the marks left by the sea on the rocks. In fine weather the tides are tolerably regular, and the rise at springs is about 2 feet.

PUNTA RUBIA (Red point).—The coast from Cape Polonio extends in a low range of sandy downs, south-west for 20 miles, to a red cliff, named Rubia, which is remarkable as the only cliff of that colour in the whole extent of the embouchure of the La Plata, whence it takes its name. The isolation of this point, surrounded by sandy downs, its height, and colour, have often caused it, from a distance, to be taken for an island near the coast, whence it was named *Isla Falsa*. The natives likewise know it by the name of Punta del Rodeo, on account of an estancia or farm that may be seen 2 miles in the interior.

With the exception of the Polonio reef the coast is all along clear of danger, and at 2 miles from the shore there are 12 and 13 fathoms water, but on nearing Cape Santa Maria it shoals to 10 and 8 fathoms.

CAPE SANTA MARIA, improperly named a cape, as it is only a low point, lies 4 miles southward of Punta Rubia, the coast between forming a small bay, in which is the anchorage of Arecife, well sheltered against westerly and south-west winds. A reef of rocks extends a cable's length to the southward of the cape. A short distance to the northward are the two small islands of Paloma and Tuna or Espinosa, which together form the small harbour of Paloma, a circular basin of 4 cables in diameter, having a depth of from 8 to 9 feet over a bottom of fine sand; about a dozen coasters could find room here. There is a small stream of fresh water at its northern end.

There is anchorage west of the cape, with off-shore winds, in 6 or 7 fathoms water, about three-quarters of a mile from the beach. Cape Santa Maria is called by the natives Punta de Rocha, on account of the town and lagoon of that name a few miles inland to the north-west. The northern islet of the two which lie off the cape is the larger, and is named Paloma, it is about a quarter of a mile in diameter, its southern part 26 feet high, and it is green; a reef extends off it 4 cables to the N.E.: the other islet, Tuna or Espinosa, (so called from the cactus which grows on its summit,) is low, sandy, and covered with brushwood.

ARECIFE ANCHORAGE, as already mentioned, is in the small bay to the north of Paloma isle. At $1\frac{1}{4}$ miles N.E. by N. from the islet there is a rocky head, having only 16 feet water over it, which must be avoided by a vessel going into the bay to seek shelter, which she may do in winds from S.S.E. round by south to N.W.; the anchorage is in $3\frac{1}{2}$ fathoms, sand and gravel, at half a mile from the islet and at rather less from the shore. The bearings for the 16-foot rock are, the centre of Paloma S. by W. $\frac{1}{2}$ W., the white sandy down near the sea on with the gap in the

hill W. by S. $\frac{1}{4}$ S., and Rubia point N. $\frac{1}{4}$ E. The distance of the rock from the shore is one mile.

CAUTION.—In approaching this part of the coast from the offing, the mariner must be on his guard not to make a mistake between Cape Santa Maria and Cape Castillo, which has been frequently done. If the weather be fine the difference of 17 miles in lat. should be a sufficient guide; but if cloudy he should remember that cape or rather point, Santa Maria is low, and backed by sandy downs of moderate height, indented by three gaps as seen from the N.E., the north-easternmost gap being twice as large as either of the others.

Also the two islets of Tuna and Paloma are low, covered with brushwood, and so close to the coast that they can barely be distinguished from it. The red cliff of Punta Rubia may perhaps be made out. No high land will be visible unless it be the cerro Narvaez, lying inland 12 miles north of Cape Santa Maria, and 6 miles from the coast. This cerro makes as a chain of hills, having on the top of the centre hill an estancia or farm-house crowned by a single, high ombu tree.

Cape Castillos on the contrary may be recognized at a distance by the round white sand-hill of Buena Vista (184 feet), and, rising up in advance of it, the steep black islet Castillo Grande (105 feet), with the detached green hill (120 feet) of Cape Polonio about 3 miles to the southward. Seen from the N.E. the coast about Cape Castillos presents the aspect of separate conical hills, while near Cape Santa Maria the appearance is of undulating sand-hills, varying from 50 to 80 feet in height. In heavy weather, if the land cannot be made out, come no nearer than 15 fathoms water, as there are 12 fathoms close to Polonio reef.

THE COAST from Cape Santa Maria extends W. $\frac{1}{2}$ N. for 5 miles to the Laguna de Rocha, and then S.W. by W. for 21 miles to San José Ignacio or Piedras point. It is composed of a beach of regular sand similar to that to the eastward; not a rock nor a single remarkable object exists on this uniform coast. A few estancias or farm-houses, surrounded by three or four trees, are seen from time to time on the summits of the sandy downs which rise from 30 to 65 feet above the sea, and gaps in these sand-hills indicate the presence of divers lagoons which exist in the interior and here fall out into the sea, as the lagoons Rocha, Cardal, Garcia, Blanca, &c. It is all along clear of dangers, and at the distance of three-quarters of a mile from the shore there from 6 to 11 fathoms water.

PUNTA PIEDRAS, or San José Ignacio point, so named on account of the lagoon of this name in the vicinity, is remarkable from a hill which rises above it, and on which may be seen, from a distance, a large white triangular patch of sand bordered by verdure. It may also be known from the offing by two large estancias, one, that of the Pescadores, 2 miles

to the N.W., the other 6 miles to the N.E. The point is formed by a frontage of rocks two-thirds of a mile in extent east and west, divided by a small sandy beach. Two rocky reefs of 7 to 8 cables extend parallel to the coast from the east and west points of the cape, forming within small creeks where boats may land.

At one mile South of the cape there is a plateau of rocks on which is a depth of from $5\frac{1}{2}$ to 8 fathoms. The mamelon or hill which forms the cape or Piedras point is about 50 feet in height.

THE SAN JOSÉ IGNACIO LAGOON falls into the sea 3 miles to the westward of Piedras point; this lagoon is about 8 miles long in a northerly direction by an average breadth of 3 miles, and is said to be deep. The Laguna Blanca debouches at $1\frac{1}{2}$ miles to the eastward of the point, and is only 3 miles in extent. The sandy beach recommences to the westward of Piedras point, and is only interrupted by some rocks, $11\frac{1}{2}$ miles to the W.S.W. of the point, near the mouth of the rivulet Maldonado; these rocks form a slight projection named point Maldonado. Between this latter point and that of Piedras the coast forms a clean regular bay about $1\frac{1}{2}$ miles deep; but from point Maldonado for 8 miles westward the coast is straight and has some rocks scattered about.

PUNTA del ESTE, or East point, which should be considered the real point of entrance of the La Plata, forms the eastern part of Maldonado bay. It is a small blackish headland at the end of some sandy downs, and rises about 50 feet above the level of the sea, with a lighthouse on its summit. Some rocks extend more than a mile to the W.S.W. In coming from the offing, if the weather is fine, the summits of the mountains Pan de Azucar and the sierra de las Animas may be seen in the N.W. 8 or 10 miles before seeing Punta del Este.

LIGHT.—On the highest part of Punta del Este (East point), at a quarter of a mile from its extremity, is a tower 90 feet high, which exhibits, at 152 feet above the sea, a *fixed* white light, visible in clear weather from a distance of 20 miles.

LOBOS ISLE, 4 miles to the south-east of East point, is flat, rugged, 65 feet above the sea, and may be seen from a distance of 12 to 15 miles. It is usually visible a little sooner than East point; its coast is rocky, and can only be approached by a sandy creek on the north side of the isle, near the place where are the huts of the seal hunters. The west side of Lobos is steep-to, and there are 6 fathoms water at less than 2 cables from the beach; but on the east side, is a detached reef which extends E. $\frac{1}{4}$ S. nearly a mile from the shore. The crown of the reef is formed by two large rocks always uncovered; between the reef and the isle there is a boat channel with from $2\frac{1}{2}$ to 4 fathoms water.

Between Lobos and the main there is a channel 4 miles wide, with a depth of 10 to 15 fathoms, mud, with sand and mud; this channel, however, had better be avoided in light winds with a swell, as the currents are stronger than in the offing. Lobos, as its name denotes, abounds in seals; they live chiefly on the rocks on the east and north side; in the interior of the isle there is an abundance of rabbits, which may be caught by hand.*

ASPECT.—Before continuing the description of the inner shores of the La Plata it will be necessary to describe the hills and mountains in the interior that are visible from the offing in clear weather, as they may prove useful in making the land. In approaching on the parallel of $33^{\circ} 45'$ S., at 10 miles off shore may be seen in the west the Sierra del Carbonero, a range of hills $4\frac{1}{2}$ miles long in a N.E. and S.W. direction, the centre being the highest; it lies inland $9\frac{1}{2}$ miles from the shore, and is on the frontier line between Brazil and the Banda Oriental or Uruguay. On one of the slopes of the hills the fort of San Miguel is very conspicuous.

CERRO de los DIFUNTOS.—After running 25 miles parallel to the coast the cerro de los Difuntos will be seen; it is composed of several summits of about the same height, and is situated 6 miles from the shore on the west side of a lagoon. Seen in the N.W. this cerro presents a gap or ravine, having a great resemblance to Rolands gap in the Pyrenees, which is a marked feature.

CERRO CHICO or AGUDO de NAVARRO.—As you advance to the south-west at the same distance from the coast, the naked conical hill of the cerro de Navarro, rising from the centre of a group of smaller hills, will show itself; it lies 5 miles W. by S. $\frac{1}{2}$ S. from the Cerro de los Difuntos, and at 9 miles from the shore. Rolands gap is well seen from this position bearing N.W. The great rounded sand-hill of Buena Vista close to the beach, already described at page 164, will here be visible in the south-west.

CERRO CHAFALOTE.—This high mountain range is much higher than those just described, and is 19 miles westward of the cape. It is easily recognized by its isolation in the midst of the plain, by its greater size, and by its outline, which seen from the eastward presents three summits of which the centre is the highest; it is steep and broken up by deep ravines. This group of remarkable landmarks renders Cape Castillos a preferable landfall to Cape Santa Maria, which is a low point, and not well marked by the surrounding high grounds.

The SOUNDINGS between the parallels of Cape Castillos and that of Santa Maria, at 2 miles from the coast, range from 8 to 13 fathoms, fine

* See Plan of Lobos, scale, $m = 1.4$ inches, on Chart of Rio de la Plata, No. 2,544.

sand; the depth is nearly the same and quite regular for 18 miles off shore, only the bottom is then muddy sand. At 20 miles East of Cape Castillos there are depths of 13 and 16 fathoms, fine sand with a little mixture of mud.

The **LOMA de NARVAEZ**, a range of hills lying 6 miles inshore from Punta Rubia, stretches from N.E. to S.W. about 4 miles. On the centre hill, which is the highest, is the estancia or farm-house Don Carlos, remarkable by a solitary high ombu tree which crowns the summit.*

SILLA CHICA is a small blackish hill at 13 miles inland, and, as its name denotes, takes the form of a saddle; although not high it is remarkable from the offing from its isolation and form, especially when seen bearing North.

SILLA GRANDE, a similarly shaped hill, lying 5 miles about W. by N. of the former, is rather more elevated, it is steep on the north side, and its form is more remarkable when seen bearing N. by W. $\frac{1}{2}$ W.

The **MORRO SAN IGNACIO** is a lofty and remarkable summit, which rises over a series of undulating hills, named Asperezas de Maldonado; it lies 19 miles N. by W. of San José Ignacio or Piedras point. Los Tres Cerros lie 8 miles more to the W.S.W.; it is a hill with three summits, the westernmost being the highest, and it is easily distinguished from the offing. The Cerro de Carape, at 19 miles northward of East point, is of moderate height and has a rounded top.

The Morros de Maldonado is a chain of small hills extending in a S.E. and N.W. direction $2\frac{1}{2}$ miles, rather higher at its ends than in the middle. The Sierra de la Ballena is another range of rocky blackish hills, extending in a nearly north direction from the Punta de la Ballena, the western extreme of Maldonado bay; it rises regularly to its centre, which is the highest part. A large patch of white sand on the south slope of one of the hills, $2\frac{1}{2}$ miles from the point, is seen a long way from sea, whether from the East, S.E., or S.W.

PAN de AZUCAR.—To the N. by W. of Punta Negra, or Black Point, is a mass of mountains, of which the culminating points, the Pan de Azucar and the Sierra de las Animas, are the highest summits of all this coast; they may be seen in fine weather at a distance of about 40 miles, and are consequently of great utility when a vessel makes the land in the parallel of, or to the south-east of Lobos islet. The Pan de Azucar, as

* The Ombu tree (*Ficus ombu*) is the only large tree which grows in the pampas or plains of this part of South America. It is a large thick-growing tree reaching from 40 to 45 feet in height. Its trunk is enormously thick and much contorted. It rises in solitary grandeur from distance to distance, and serves to mark an estancia, and is often the only object that breaks the monotony of the horizon. See also note, page 198.

its name indicates, is a nearly regular cone, and rises 1,375 feet above the sea at only 3 miles from the beach ; it is of granite, and a black, arid mountain, isolated from all the surrounding heights, and its base is about as broad as it is high.

The **SIERRA de las ANIMAS** lies 5 miles to the N.W. by N. of the Pan de Azucar, and rises still higher (1,765 feet), but its summit is flattened, and has a slight depression in the form of a saddle, which is visible when seen bearing W.N.W. The other summits of this mass of mountains are much less elevated ; they are named, to the south-east, the cerro Ingles, the cerro Chico, and cerro de los Toros ; and to the north-west, the cerro Betet.

We now return to the description of the coast from Punta del Este or East point.

MALDONADO BAY, 5 miles wide by nearly 2 miles deep, is formed by East point and that of Ballena. It is exposed to S.W. winds, which cause much sea, but a portion of the bay is sheltered by the small island of Gorriti and by the patch of the Monarch rock. On the beach north of Gorriti is a wooden pier, and inside East point is a small sandy cove, the latter is the only place at which supplies can be shipped when the surf is on the beach after S.W. winds.*

The shores of the bay are clean with the exception of Arecife or Granite point, 2 miles westward of the pier, which is rocky. Thence round to near East point the shore is composed of sandy hillocks and ridges from 20 to 40 feet high, covered with light brushwood. The small town of Maldonado, which gives its name to the bay, stands on the brow of a hill about 200 feet high, three-quarters of a mile from the beach, with a population of about 1,500 inhabitants. It is conspicuous by a square tower about 120 feet high, painted white with a red base. San Carlos, a town of about the same size, is 7 miles farther inland.

Gorriti island, which gives shelter to the anchorage, is nearly a mile in length north and south, and about 3 cables average breadth. It is low, of sand and rock, and has a small bay and beach on its west side. Some small batteries, and a storehouse for the produce of the seal fishery, existed here in the beginning of the century, but are now in ruins. A rocky ledge extends a cable off its north-west end, steep-to, with 6 fathoms water alongside them, and a sandy spit 4 cables off its north-east end ; which must be carefully avoided.†

* It is said that the sands have accumulated and the depths decreased in this bay. There does not appear any foundation for this rumour, the surveys of Oyarvide in 1801, and of Barral in 1830, are far too incomplete to afford data for such assertion.

† See Plan : Maldonado Bay, No. 548, scale, $m = 3\cdot2$ inches.

At nearly half a mile W. by S. from East point is the outer edge of a reef of rocks about 3 cables in diameter, with only one fathom water over it, and on which the sea always breaks. The New or Parker rock is a shoal about a cable in diameter, with $4\frac{1}{4}$ fathoms water on it. It lies W. by S. $\frac{1}{2}$ S. distant one mile from East point, and S. $\frac{1}{2}$ E. 7 cables from the south point of Gorriti island, with Maldonado tower over the first rock on the west side of a sandy cove at the south end of Gorriti; and the wooden hut on East point once and a half the breadth of the Salt mill open southward of it.

The wooden hut three times the breadth of the mill open southward of it, or the extreme of East point bearing E.N.E., leads to the southward of the rock; and Maldonado tower, over the south-west side of Gorriti, leads to the westward. The bottom near it is rocky and uneven, and the depth varies from 7 to 12 fathoms.

THE MONARCH is a rocky patch with 4 fathoms water on it, but probably less, which would bring up a vessel of large draught. This shoal lies half a mile W.N.W. of the north-west point of Gorriti, leaving between a channel 3 cables in breadth with 7 fathoms water. The leading mark through is the dome of the cemetery over the pier, bearing N. by E. To the westward of the shoal there are no dangers. The Maldonado tower over the pier N.E. by N., leads 2 cables westward of it; and the Pan de Azucar over a small low saddle immediately within Ballena point W.N.W. leads on it, but kept open the apparent breadth of the Pan de Azucar either way clears it north and south.

A vessel should not approach the Monarch patch nearer than 6 fathoms. The cemetery appears like a low dark wall with a white dome near its west end, about half a mile N. by E. of the pier, appearing half-way up the slope of the land westward of Maldonado tower.

There are no tides in Maldonado bay, strong southerly and south-east winds raise the water 6 feet, and the opposite winds depress it.

ANCHORAGE.—Vessels of any size may anchor in safety in $5\frac{1}{2}$ fathoms water, sand over stiff mud, with the north-west end of Gorriti island from S. by W., to S.W. $\frac{1}{2}$ S., and Ballena point about W. by N. Small vessels may anchor with the north-west point of Gorriti S.W. $\frac{1}{2}$ S., the north-east end S.S.E. to South, and the pier N. by W. to N.N.W., clay and stiff muddy bottom with layers of sand. There is also anchorage sheltered from all winds but those from the S.W. which are the most dangerous here, eastward of Gorriti, in 5 or 6 fathoms, muddy bottom, with the mill or building on the extremity of East point bearing S. by E. and the north end of Gorriti W. by N. or W. by N. $\frac{1}{2}$ N.

The reef will shelter a vessel from the winds from the south, but which blow occasionally very strong. In all cases when necessary to moor, it should be with open hawse to the S.W.

PILOTS.—A Pilot resides at East point, and is a general pilot to Buenos Ayres, &c. Pilot cutters are also frequently off this bay, having both Buenos Ayres, Ayrean, and Monte Videan pilots on board; they are mostly English, Americans, or Italians.

SUPPLIES.—Water may be obtained from a small running stream, about 150 yards eastward of the pier. Moor the boats close to the beach, and lead hoses off from the watering engines. The lower part of the water when it reaches the beach is brackish, but from between the banks it is excellent; by sinking a tub to put the hose in, and having about 200 feet of canvas hose and about 120 of leather to lead through the water, 40 tons may be obtained in a day.

There is generally a little surf on the beach, and after a S.W. wind, for two or three days there is no landing on it, but in summer on an average water may be had five days in a week. There is also a lake of very good fresh water at 2 miles westward of the pier within 50 yards of the sea, where a vessel could anchor in fine weather for the purpose, but no vessel should remain there longer than actually necessary, as the bottom is sand, and the swell comes in heavily with S.W. winds. Fresh beef and vegetables may be had at very moderate prices. Live stock is reasonable, and cheaper than at Monte Video.

DIRECTIONS.—A vessel bound into Maldonado bay may pass either side of Lobos isle, avoiding the reef extending from its east side. East point will be known by the lighthouse, and by a large dark wooden framework at its extremity. If southward of Lobos isle, the town and tower of Maldonado will be seen, and probably the Pan de Azucar, and the Sierra de las Animas north-west of it. Having passed the isle, East point should not be brought to bear eastward of E.N.E., and when Maldonado tower is open of the south-west side of Gorriti island, bearing N. $\frac{1}{2}$ E., haul up for either channel, keeping the Pan de Azucar open of Ballena point.

When Maldonado tower is in line with the pier bearing N.E. by N., a vessel may haul in for the passage westward of the Monarch shoal, until the Pan de Azucar shows northward of the saddle on Ballena point, or the point bears W. by N. $\frac{1}{2}$ N.; then steer for the anchorage: or the dome of the cemetery in line with the pier N. by E., will lead in eastward of the Monarch in 7 fathoms water. With the wind at S.E. by E., a vessel may fetch the anchorage by passing east of the Monarch, but a tack must be made if westward of it. Do not approach the pier nearer than a third of a mile.

Ballena point is bold, and may be passed at a prudent distance. In working into the bay from the westward, a vessel may stand into 6 fathoms water, at the distance of a long half mile from the shore; and in approaching the Monarch, keep the Pan de Azucar northward of the saddle on Ballena point.

SOUTH-EAST CHANNEL.—Between the north-east end of Gorriti and the main the ground is very uneven, but there is a channel about a cable in breadth carrying 4 fathoms water, which in fine weather may be used by small vessels having local knowledge, as no direct marks can be given. In fresh southerly winds the sea breaks right across. Pilot cutters and small coasters sometimes pass between East point and the reef west of it, but the current here runs strong, and renders the vessels almost unmanageable in a moderate breeze.

Strangers in boats should be careful not to be set amongst the breakers of the reef, as they are treacherous in the finest weather.

POTRERO BAY, west of Ballena point, and between it and Level point, is $7\frac{1}{2}$ miles in extent, and takes its name from an adjacent lagoon, which here has its outlet. The bay is clear, and affords anchorage with off-shore winds in from 5 to 6 fathoms water, gravel bottom, at 2 miles from the beach.

PUNTA NEGRA, or Black point, which presents an east and west headland or frontage $2\frac{1}{2}$ miles in extent, is formed by three rocky points, separated by two small sandy bays. The eastern point is named Raza (Level), the centre Negra (Black), and the western Iman (Magnet); they are all steep, and are overlooked by the high grounds which are connected with the Pan de Azucar. The depths off this headland range from 7 to 10 fathoms close in shore. After having rounded Iman point, the shore trends to the N.N.W., and at 3 miles is the rocky Punta de Burros (Donkeys); the small bay which lies between is called Puerto Ingles. At 5 miles beyond is the Punta de la Sierra; it is low, and a reef of rocks extends 2 miles off it.

The **PUNTA de AFILAR** lies 7 miles westward, with a clean sandy beach between. About one mile to the westward of the Sierra, the Arroyo de Solis falls into the bay. This point takes its name from some conical hills close at hand, called Piedras de Afilas (whet stones), in which are quarries of this sort of stone. Two of these hills higher than the rest are conspicuous from the offing as two mamelons or teats; on the northern was formerly a look-out station, whence the arrival of vessels was signalized to Monte Video. The slope of the southern hill forms the point de las Piedras, which is low, salient towards the S.S.W., and bordered by steep rocks having 5 fathoms close to. The surf is heavy on this coast.

AFILAR BANK, or Isla Chica, is a reef of stones nearly awash; it lies $1\frac{1}{2}$ miles south of the Punta de Afilas; it is surrounded by breakers, and covered at high tides. The bank de Solis, 3 miles eastward, lies 3 miles off shore; it is rocky, 4 cables long east and west, and 2 cables north

and south; it is awash, covered at high tides, and the sea breaks on it constantly. There is a depth of 3 fathoms, sand and mud, between the rocks and the shore. From the crown of the reef the Pan de Azúcar bears E. by N. $\frac{1}{2}$ N., the Sierra de las Animas in one with the mouth of the Arroyo de Solis N.E., Punta de Aflar W.N.W. $\frac{1}{2}$ W., and Punta Negra E.S.E. $\frac{1}{2}$ E.

PUNTA de PIEDRAS NEGRAS, the next salient point, lies about W. $\frac{1}{2}$ S. 10 miles from that of Aflar; the sandy beach between is broken by a rocky point named Pedro Lopez, and the rivulet Solis Chico falls into the sea about 3 miles westward of it. Piedras Negras point, as well as Pedro Lopez, are both double points, with a small beach between. A rocky shoal, less than that of Aflar, lies S.E. at a short distance from Piedras Negras, with a 3-fathom channel between fit for boats.

La PLAYA de SANTA ROSA, an extensive gravel beach, ranges for 19 miles beyond to the W.S.W., as far as Punta Buceo or Carretas point; it is rather sinuous, but clean and steep-to; there are 3 fathoms nearly touching the shore. The sea is very heavy along this coast in all winds between South and East, and the strong currents would drive a ship bodily ashore. Several vessels have been lost here, and their crews have perished, not from rocks, but from the heavy surf that breaks on this steep shore.

Close to the westward of the point De las Piedras Negras, is a small bay about $1\frac{3}{4}$ miles across, where is a depth of from 3 to 4 fathoms, mud; a small stream of fresh water runs into it, and the beach is of hard sand, and steep. At 4 miles farther to the west, the little river of Pando falls into the sea; the town is on the right bank of the stream, and 5 miles inland.

SANTA BUCEO POINT has a reef projecting off half a mile; it is low, rocky, and backed by a large hill, which has obtained for it also the name of Punta Gorda. This serves as a mark to recognize the point.

BUCEO and PIPAS BANKS.—The Buceo bank lies N.E. by E. $\frac{1}{2}$ E. 6 miles distant from Buceo point, and N.N.W. $\frac{1}{2}$ W. 5 miles from Flores lighthouse; it is $1\frac{1}{2}$ miles in extent, having a channel $1\frac{1}{2}$ miles wide and 3 fathoms deep between it and the shore; the currents set through very strong, and it is not safe to attempt the passage under sail. Carretas or Pipas bank is a small rocky shoal extending half a mile E.S.E.; it is covered at high water, and lies $2\frac{1}{2}$ miles from Buceo point. At two-thirds of a mile E.N.E. $\frac{1}{2}$ E. from this latter point is the reef of La Luz, named after a Spanish vessel lost here in 1752, which drove here during a storm from the roadstead of Monte Video, and she became a total wreck.

A rock, named Doguel, is said to exist at 6 miles east of Buceo point,

but it is far from certain that it may not be Buceo bank, which lies at the same distance from the point, but 2 miles more to the N.N.W. All this space between point Buceo and Flores, although 7 miles wide, appears to be doubtful ground, and should be avoided. The currents are also stronger in this channel than south of Flores.

FLORES ISLE, at $7\frac{1}{2}$ miles E.S.E. of Buceo point, is a good landfall, and one always made; it lies 56 miles about W. $\frac{1}{3}$ S. from Lobos. The islet is 7 cables long N.E. and S.W., and 2 cables wide. It is low, but has a slight eminence in the middle and at each end, and particularly to the S.W.; the ground between these heights being low and marshy is at times overflowed. The coast is steep-to, except to the N.E., where a reef projects half a mile; there is anchorage all round the islet, but the best is to the W.N.W. at half a mile off shore, in 5 fathoms water, mud. At the west point of Flores there is a creek in which coasters find shelter with easterly winds.

At about three-quarters of a mile S.W. by W. of the islet is an apparently isolated rock, having only 17 feet over it, on which H.M.S. *Cumberland* struck on the 15th March 1858, and remained seven hours, receiving much damage. There is 5 fathoms water between the rock and the shore. This danger should be carefully avoided.

At 4 miles to the westward of Flores, and at the same distance from Buceo point, the charts show a shoal, named the *Néréide* or Buen Viage, of which we have no particulars. The transport *Nautilus* is said to have struck upon a 14-foot rock, but from the bearings it was probably on the Carretas bank. The *Sara*, of London, too, is said to have grounded upon a shoal, the position of which is doubtful.

LIGHT.—On the most elevated point of Flores islet to the south-west, which rises 50 feet above the sea, is a white lighthouse, which shows a *revolving* white light once in *three minutes*, at a height of 104 feet above the mean sea level, and should be seen 12 miles in clear weather. This light was first exhibited in the year 1833. The mariner is warned that it is not to be depended upon.

BASSURAS BAY, formed between Buceo and Bravo points, is 6 miles in extent and $1\frac{1}{2}$ miles deep; it includes five small bays separated by as many points of rock. Near the middle of the bay is the small islet of Meldroza, between which and the main is an anchorage for coasters in $3\frac{1}{2}$ fathoms. These five small bays receive five streamlets, known by the name of Estanzuelas, and there all the washing of the town of Monte Video is done. A short distance off shore in this bay it appears that some rocks exist whose position is unknown, the mariner, therefore, should be on his guard.

There are some islets and patches of rock within the bay. Ratones islet to the north-west was formerly fortified, but now is used only as a store-house, and occasionally as a lazaretto; it is surrounded by rocks. At 4 cables to the south-eastward of Ratones is a reef awash, at very low water, named Piedra de Sarina, which is marked by a beacon; another smaller patch lies 3 cables to the north of Ratones, and on the east side of the bay, at half a mile north of the mole, is a group of rocks named Piedras de Familia. On the north beach near the Punta de Piedras is the spot on which H.M.S. *Gorgon* was stranded, when driven from her anchors in a pampero on the 10th May 1844.

EL CERRO or The MOUNT, is the distinguishing feature of the port. It rises on the western side of the bay in the form of a regular, isolated, bare cone to a height of 465 feet, at less than three-quarters of a mile from the beach. It is crowned by a fort, on which there is a lighthouse. The Cerro is useful to the mariner on all occasions, whether on his voyage up or down the river, as a conspicuous and easily recognized landmark, and by careful observations it will very materially assist in ascertaining the direction and force of the currents, which are so variable and uncertain.

SAN FELIPE de MONTE VIDEO, the capital of Uruguay, stands on a gently rising ground on the east side of the bay, at its entrance, occupying a small peninsula, extending east and west $1\frac{1}{4}$ miles by half a mile average breadth. The principal building is the cathedral, an imposing structure, with its dome and two towers, which may be seen a long way in the offing. The houses are mostly of one floor and flat-roofed; the streets cross each other at right angles, and are paved. The Custom House is on the north face of the town, near which some small moles or piers project into the bay. The defences of the town consist on the east or land side in a strong wall, which crosses the neck of the peninsula from the harbour to the sea, and on the west side in the small fort of San José at the entrance.

Consuls of all nations reside here, and there is an English church on the south side of the town near the shore. The trade of Monte Video is considerable; the exports, consisting of wool, hides, sheep-skins, tallow, salt, beef, bones and bone-ash, horns, wheat, &c.; and the imports of cotton and woollen fabrics, hardware, wine, &c. The number of vessels that entered inwards in 1858 was 936, amounting to 186,699 tons; while those that cleared outwards were 922, and their tonnage 183,230; whilst in 1862 the number of vessels entered inwards was 843, amounting to 259,652 tons. In the year 1858 the value of the exports amounted to 1,152,892*l*. The population of the city and the immediate neighbourhood in 1862 was about 60,000. Labour and materials for any kind of repairs are extravagantly dear.

Supplies.—Water and other supplies may be got easily at Monte Video. In 1859, fresh beef was 2*d.* and vegetables 1½*d.* per pound. Several small streams run down the slope of the Cerro; the most convenient is that half-way between South-east point and the Punta del Cerro. The water of the Miguelite and Colorado or Pantanoso on the north shore is not good, nor can boats easily approach these streams. Water is also brought off from the town at about 1½ dollars per ton. In 1862 coal was 2*l.* 10*s.* per ton.

LIGHTS.—A *fixed* and *flashing* light showing a flash every *three minutes* is exhibited from a light-tower within the fort on the summit of the Cerro, at an elevation of 486 feet above the sea, and should be visible in clear weather, when kept properly trimmed, at a distance of from 20 to 25 miles. A white light is also shown at 147 feet above the sea by the dial-plate of the clock in the south-east tower of the cathedral, having been lighted by gas, visible from 6 to 10 miles, which enables vessels to anchor in the outer road at night, by cross bearings of the two lights.

The ANCHORAGE for large vessels in the road at Monte Video is about 2 miles southward of San José point, in 22 feet water, mud, with the Cerro bearing about N.W. ½ N., and the cathedral N.E. or N.E. by N. Vessels may anchor farther in as convenient, and those of light draught in the inner anchorage, in from 9 to 14 feet water, mud.

Captain Sir Thomas S. Pasley says :—"Vessels who can depend on their anchors and cables may anchor safely in the road of Monte Video in the same depth of water as they draw, provided the river is at a mean height, for, whenever the wind sets in from the southward, the water rises sufficiently, and the bottom being so very soft, 3 feet more than the vessel's draught is amply sufficient to ride out the heaviest gale without injury." The sailor will of course keep clear of his anchor.

TIDES.—There are no regular tides at Monte Video ; in fine weather there may be a set of a quarter to 1¼ miles an hour, but its direction is uncertain, and the water rises and falls occasionally as much as 4, 6, or even it is said 8 feet, but this is entirely due to the wind, the water rising with East, S.E., and S.W. winds, and falling with those from the opposite quarters. The water forced into the bay by the first part of a strong S.W. wind is heaped up, and rushes out, long before the wind has ceased to blow, as a counter current round the point San José, causing vessels to ride across the wind, to roll frightfully, and frequently to part their cables and go on shore.* The bottom, however, is so soft that they get off again without damage to the hull.

* The water in Monte Video bay is occasionally fresh enough to cause a difference of 3 inches in a vessel's draught.

If vessels moor it should be with open hawse to the S.W., being the quarter from which the pampero blows strongest. One great evil is the generally crowded state of the small harbour, rendering it difficult to get under way without fouling some other vessel; and even then it is necessary to be towed up towards the Cerro before making sail, but by which you gain a steady breeze.

LOBOS POINT, the south extreme of the Cerro or mount, and of the bay on the west, has some rocks off it to the distance of half a mile, known by the name of Piedras Blancas, or White rocks, with 20 feet water close to; the coast thence trends to the west, forming three rocky points, the westernmost of which, named Yeguas, is low, in the form of an islet, and joined to the main by a tongue of sand, with a reef on the east side, but steep-to on the south. Assuming a north-west direction for 7 miles the coast forms six small sandy bays separated by rocky points, three of which are named respectively Tomador, Pedregal, and Castro points.

ESPINILLA POINT is the southern limit of the embouchure of the river Santa Lucia, and the western termination of the elevated ground which at its south-eastern end rises into the mount. Its extreme point is low and rocky, and extends half a mile to the south-west, where is a depth of only 7 feet, fine sand; the 3-fathoms line of soundings is found at three-quarters of a mile off shore. There are some remarkable white patches on the rise of the point.

The **PANELA**, a dangerous reef which, it is said, never breaks, lies about S. $\frac{1}{2}$ W. from Espinilla point, distant $4\frac{3}{4}$ miles; and W.S.W. $\frac{1}{2}$ W. from the cerro of Monte Video. This reef, as reported by Captain Barnard of H.M.S. *Vixen*,* who examined it in 1853, extends some distance E.S.E. and W.N.W., probably 400 yards; it has several rocky heads upon it, with 7, 10, and 13 feet water on them. M. le Capitaine Barral, who sounded over it in 1829, says 3 feet. It is, or it was, marked by two sticks, called beacons, one at each end, at 700 yards apart, but they are so insignificant that they are hardly seen beyond 3 cables' lengths off, and they are occasionally washed away.

Captain Barnard, in a boat from the depth of 9 feet, made the dome of the cathedral bear E. by N., Cerro lighthouse E.N.E., and the westernmost white patch, on Espinilla point, which is remarkable, N. $\frac{1}{2}$ W.

DIRECTIONS.—The lead gives no warning of this danger; all around there is a depth of 4 fathoms, mud. A vessel in the vicinity of the reef

* The *Vixen*, on the 18th June 1853, bound from the Falkland Islands to Monte Video, took her departure from Cape Corrientes, and in crossing the Rio de La Plata, met, as usual, with a strong S.E. wind and thick weather; she was set a few miles to the westward of her port, and had just made out the beacons and the loom of the land, when she struck on the Panela reef, and knocked her rudder off.

spit of the Great Ortiz bank here leaves the shore in a S.S.E. direction, and forms a *cul de sac*, named the Ensenada de Pavon, where is a rather exposed anchorage for vessels in $3\frac{1}{2}$ fathoms, mud. There is, however, an inshore channel, between the great mass of the Ortiz bank and the land, for coasters, gunboats, and all vessels that do not draw more than 12 feet water, for 37 miles to Colonia. At the river Cufre, 6 miles beyond the Pereyra, the coast changes from a north-west to a general west direction, and so continues to Colonia. The sand-hills become more elevated, rising to 140 feet; one of them has the form of table land, and seems to mark the entrance of the river Cufre, which is 3 miles to the westward. This part of the coast is known by the name of El Rincon del Cufre. A few small rocks lie off the point of the river Cufre.

From the rio Cufre westward there are three points. The first point, Rosario, formed by the embouchure of the river of the same name, is low, and not easily distinguished, the hills between reaching the height of 140 feet. Sauce point is easily made out, as it is the most wooded on this part of the coast, and has some high sand-hills $1\frac{1}{2}$ miles to the north. Some small rocks, partly uncovered, lie off the point to the south-east. Coasters may anchor under the lee of this point, sheltered in winds from S.E. to North. Artilleria point, at 5 miles west of Sauce point, forms with it a rather deep bay of the same name, into the head of which the Sauce river, a small stream, empties itself. The sand-hills here rise to 150 feet above the sea. Artilleria point is bordered by rocks, which extend 4 cables to the southward.*

Another rocky point called Punta Angostura succeeds, then the outlet of the rio Chuelo, and 2 miles to the westward the Lagunas de Patos, off which the water deepens to 3, 4, and 6 fathoms, which latter depth is carried up until Colonia lighthouse bears about East.

LAS PIPAS ROCKS, $6\frac{1}{2}$ miles W. by S. of Artilleria point, and 2 feet above water, lie $1\frac{1}{2}$ miles off shore, and the reef extends $1\frac{1}{2}$ miles in an east and west direction; both within and without the reef there is a depth of $2\frac{1}{2}$ fathoms. These rocks take their names from their appearance of barrels floating on the water. At $1\frac{1}{2}$ miles N.E. of Las Pipas is another reef, one mile from the shore.

LA COLONIA del SACRAMENTO is built on a slightly elevated peninsular point, to the westward of which extend some islets and reefs, which shelter the roadstead. The north-west point of the peninsula is named San Rita, and the south-west point San Pedro. Vessels drawing 18 feet can find good anchorage, but the reefs which shelter the road from the west and south make the entrance difficult, and render it neces-

* See Chart:—Sauce Point to Martin Chico Point, No. 1,751, scale, $m = 0.9$ inches.

nary to take a local pilot; vessels may anchor at 5 cables from San Rita point, bringing the light to bear about S.E. by E., where there is anchorage in from $4\frac{1}{2}$ to 5 fathoms water, mud.*

If necessary to moor, it must be with open hawse to the S.S.W. At this anchorage vessels are sheltered from winds from the north, round by east to S.E., but the only protection against S.W. winds are the off-lying islet of San Gabriel and the Laja bank.

The Hornos islands afford excellent shelter from S.W. winds round by south to E.S.E. The strongest winds are from the westward, but then there is less sea and they are not felt so much as those from S.E. to E.S.E. There is good anchorage on the north side of Gabriel islet, but vessels of large draught should moor. Coasting vessels in this vicinity when overtaken by bad weather seek shelter here.

LIGHT.—The light at Colonia is established at the south-west angle of the plaza. It is a white *revolving* light, attaining its greatest brilliancy every *three minutes*, at a height of 110 feet, and said to be visible at 10 miles distance in clear weather.

ISLETS OF COLONIA.—San Gabriel islet, $1\frac{1}{2}$ miles to the west of Colonia, is low, slightly wooded, and half a mile long by $2\frac{1}{2}$ cables broad. At a quarter of a mile to the eastward is the Laja, a rocky bank, which breaks in a strong breeze. The Farallon is a rocky islet 12 feet high, which lies S.W. by W. of San Gabriel; it is surrounded by a reef, patches of which extend 7 cables to the northward with 9 and 10 feet water on them, and from the south-east side the reef extends off nearly 4 cables.

LOPEZ ISLETS lie east and west about 2 miles north-west of Colonia; they are bare rocks, 8 and 10 feet high, each in the midst of a long sandy flat or spit, which extends to the N.W. beyond the Hornos islands. There is a channel between the two islets and flats about 2 cables wide, with about 16 feet of water. To the northward of Lopez East islet a deep bight runs eastward, into the sandy flat, having a depth of 20 to 24 feet, which is called Lopez road. At $1\frac{1}{2}$ cables north of the islet H.M.S. *Comus*, in 1847, was hove down to repair damages, as being the most sheltered spot on this part of the coast.

BEAUMANOIR REEF.—There are three or four small shoals shown on the chart, but the outer is the Beaumanoir reef, at 2 miles W. by N. of San Gabriel, which has one spot with 12 feet on it. It was so named after a French brig that touched upon this rock in 1855, in working up to the Hornos anchorage. The bearings from it are, Lopez West islet N. E., by E. $\frac{1}{2}$ E., an isolated tree on the coast, in one with the west point of the Middle Hornos islet, North, and the western Estancia N.E. $\frac{1}{2}$ E.

* See Plan:—Colonia Roads, No. 2,004, scale, $m = 4.0$ inches.

FISHERS BANK, the north-west spit of the Orteiz bank, called also the Pescadores, forms the shelter to Colonia road on the south. The great Orteiz bank or flat of muddy sand is an important submarine feature, and stretches three parts across the La Plata ; it extends from Colonia to the eastward along the north shore for about 37 miles, to the outlets of the rivers Pavon and Pereyra, while its eastern 3-fathom edge trends to the S.S.E. 35 miles out into the river, forming a bank or flat of more than 600 square miles, the depth over it, as far as it has been sounded, being from 9 to 12 and 15 feet.

Along shore at its northern edge is its deepest part, and coasters and small steamers can carry 12 feet through this inshore channel to and from the roadstead at Colonia. The north-west spit of the Fishers bank has two or three patches with 10 to 12 feet water on them near its extreme point, which must be carefully guarded against.

DIRECTIONS.—A vessel with a fair wind, or a steamer, bound to Colonia road from whatever quarter, except along the inshore channel from the westward, should pass to the southward of the Farallon, giving it a berth of $1\frac{1}{2}$ miles until the centre of San Gabriel islet bears N. b. W.; steer on that course until within $1\frac{1}{2}$ cables of the shore of the islet; then alter course, sharp, to E. by N. for $1\frac{1}{2}$ miles, or until Colonia light-house bears N.E.; when again alter course sharp to N. by W. for about half a mile to the anchorage, in 25 feet water, mud, with San Rita point bearing East, and the group of trees on the high ground at Real de San Carlos N. $\frac{1}{8}$ E.

On account of the narrowness of the channel between San Gabriel islet and the Fishers bank southward of it, no sailing vessel should attempt to work through ; and all vessels should allow for the current which at times sets strong towards Fishers bank.

The HORNOS ISLANDS lie 2 miles N.W. by N. of Lopez islets ; they consist of three small low islets lying in an east and west direction, with a channel of 16 to 19 feet between the two eastern. The best anchorage is 3 cables N.N.W. of the western islet, in 18 feet, mud ; vessels of war on this station frequently resort to this anchorage to exercise their guns at a target.

The eastern shore from Manuel point, opposite the Hornos islands, now assumes a N.W. direction for about 22 miles to Martin Chico point, the coast is slightly elevated, rising into hills from 100 to 120 feet high. The chief features are the ombu tree of San Pedro and the river of the same name north of it, also the ombu and river of San Juan, and 6 miles inland the Cerros of San Juan, which serve as a landmark over all this upper part of the river. The seine may be hauled on the main land.

The CERROS de SAN JUAN are three summits of the same hill, which forms the culminating point of all this coast ; they lie 17 miles N.N.W.

of Colonia, and at 6 miles from the coast. The northern hill is 445 feet high, the middle 350 feet, and the southern 370 feet. They serve as a landmark, very useful to navigation over this upper part of the river, and in clear weather they can be seen from the tops of the houses in Buenos Ayres, a distance of 33 miles. This is generally considered a sign of bad or wet weather.

MARTIN GARCIA ISLAND stands boldly up in the channel $25\frac{1}{2}$ miles N.W. by W. $\frac{1}{3}$ W. of Colonia; it is a mass of granite almost circular, with the form of a flattened cone, 82 feet high; it is about 2 miles in circuit, with its shores rocky except on the north-west part, where is a small beach and a landing-place. Its position between two narrow channels which lead to the great rivers Parana and Uruguay, renders it a strategic post of some importance, as, in going up or down, a vessel must pass within half a mile of the islet on the south side, and within less than one mile by the Canal del Infierno. There is a battery on the south-west point, and a small garrison from Buenos Ayres; also some workers in the quarries, as the stone is good for building and paving. There are some trees and bushes on the heights.

There are two passes or channels to ascend the river above Martin Garcia, one to the S.W., the other to the N.E. of the isle. The former is called the Martin Garcia channel, is marked by beacons, and the only channel used; the latter is named the Canal del Infierno, from the difficulty of navigating it before the surveys of Lieut. Page, U.S. Navy, and Lieut. Sidney, R.N., both made in the year 1855, and on account of currents and banks which render it tortuous.

The Martin Garcia channel is half a mile wide, and from 20 to 40 feet deep. It is formed on the west side by the extensive bank called Playa Honda or the Palmas flat, which blocks up two-thirds of the area of the river, and on the east by the St. Anna and some other detached banks, which extend to the south-eastward from Martin Garcia, and between which it would be difficult to navigate without a beacon always in sight, not only to point out the route, but also to show the set of the current, which varies. These beacons unfortunately are generally nothing more than sticks, about 6 feet high, and are very difficult to make out.

In approaching from the south-eastward it requires some care to get sight of the first beacon; in the year 1860 it was placed with the following bearings:—Martin Garcia, hardly visible in the horizon, N.W. by W. $\frac{3}{4}$ W. $11\frac{1}{2}$ miles; northern summit of the Cerro de San Juan, N.N.E. $\frac{1}{4}$ E.; Black bush on the point N. by E. $\frac{5}{8}$ E.* The next beacon is $2\frac{1}{2}$ miles to the

* Mr. Aylen, Master of H.M.S. *Ardent* in 1861 states that this beacon is now about 2 miles farther to the northward, and that it is large, substantial, and likely to last.

N.W. $\frac{1}{2}$ W. ; and the last beacon before reaching Martin Garcia lies $2\frac{1}{2}$ miles S.E. by E. $\frac{3}{4}$ E. from the summit of the island. This channel is only fit for vessels of about 12 or 13 feet draught, although those of 15 feet and more have passed up.

DIRECTIONS to the BOCA de GUAZU.—Vessels bound to the Boca de Guazu should give the Farallon a berth of one mile, and steer N.N.W. until the outer Hornos island is on with Colonia lighthouse, then proceed on this line. But if the river is low, continue N.N.W. until the ombu tree of St. Pedro bears E. $\frac{1}{2}$ S. ; then steer W. $\frac{1}{2}$ N. until the lighthouse is on with the outer Hornos island, when haul up W.N.W. for the large beacon of St. Juan, which lies with the centre of Martin Garcia bearing N.W. by W. $\frac{2}{3}$ W.*

Leave the beacon on the starboard hand, and haul up a little to the northward of N.W. by W. until the water shoals near the south-east end of Santa Anna bank. Here it is difficult to see the Hornos islands or Colonia, and as the beacons are at times washed away, the lead is the principal guide. When in 3 fathoms water, near the tail of Santa Anna bank, keep to the westward in the main channel, where there are 5 and 6 fathoms water, but always skirting the curve of Santa Anna bank until Martin Chico point bears N.W. by N. ; then, if no beacons are seen, anchor.

The channel between the Middle bank and the tail of the flat extending from Martin Garcia should now be buoyed, as it is only about three-quarters of a cable in breadth, and frequently with not more than 16 feet water in it. When there are 16 feet in the Middle bank channel, there will be 13 feet water on the Flats, which commence about 15 miles below Martin Garcia. Having passed through the Middle bank channel, steer for the south point of Martin Garcia, leaving a beacon lying with the building on the highest part of the island bearing W.N.W. about a cable on the starboard hand. The edges of the banks are generally known by the ripple.

Pass Martin Garcia at from one to 2 cables, and steer about W. by N. $\frac{1}{2}$ N. for the beacons marking the shoal extending north-westward from the island. Follow the shoal round by the lead, and haul up the main channel with the high bluff of Punta Gorda just open of Juncal island until abreast Las dos Hermanas islands and bank ; the high land of Punta Gorda should then be brought over Juncal island until the Boca de Guazu is well open, or the village of Las Vacas on the Banda Oriental shore bears W.N.W. In this part of the river the water rises and falls much the same as in the La Plata. A vessel at anchor lies with her head up the river.† The

* The above directions are chiefly by Thomas Aylen, Master, H.M.S. *Ardent*, 1861.

† See Chart :—River Uruguay, Part I., No. 1,938, scale, $m = 0.9$ of an inch ; and Index Chart to the Parana and Uruguay Rivers, No. 2,039, scale, $m = 0.5$ of an inch.

highest tide abreast the Hornos islands is about an hour after the setting of the moon.

EL CANAL del INFIERNO, which passes to the north-east of Martin Garcia, has long been known to coasters, and in 1855 was thoroughly sounded by Lieut. Page of the U. S. Navy, and by Lieut. Sidney, R.N. It appears that it has as much water as the western channel, but it is more difficult to navigate on account of the frequent change of course and the more rapid currents. To cross from a berth in mid-channel of the Canal del Infierno into that above Martin Garcia, bring the Carretas rock southward of Martin Chico point, and south Cerro of San Juan in line bearing W. $\frac{1}{4}$ N.; then steer N.W. by W. $\frac{1}{4}$ W. about $1\frac{1}{2}$ miles or until Martin Chico point comes in one with the south Cerro of San Juan E. $\frac{1}{4}$ N., then keep it on that bearing until the high wooded bluff of Punta Gorda is just open of Juncal island, and steer up the channel with this mark until abreast Las dos Hermanos islets and bank; the Punta Gorda should then be brought over Juncal island until the Boca de Guazu is open.

It is needless to say that neither of these channels should be attempted in foggy weather or by night. Here, as elsewhere in the La Plata, the height of the water depends on the force and direction of the wind; it rises 5 and 6 feet with S.E. and South winds, and falls with those from the opposite quarter.*

THE RIVER URUGUAY rises in Brazil, in the Sierra de Santa Catharina, and flows first west and then south, separating Brazil and Uruguay from La Plata, and falling into the Rio de la Plata, where its waters preserve their clearness for miles before they are lost in the muddy current of the Parana. Its whole length is nearly 900 miles, and it is navigable for vessels of about 12 feet draught as far as Salto, and for small steamers beyond it. The entrance of the Uruguay is 20 miles N.W. by N. of Martin Garcia; it is formed on the west by the mangroves of the delta of the Parana, and on the east by some high ground terminated by two principal headlands, Punta Gorda, a wooded bluff 85 feet high, to the south, and Punta Chaparo on the north, 5 miles apart. The river here is narrowed to about a mile in breadth, and varies from 12 to 15 fathoms in depth.

Above Punta Chaparo it widens out to 5 miles, and preserves nearly that breadth to Cape Fray Bentos. Two villages are situated on this eastern coast, Las Vacas, near the outlet of a river of the same name, and opposite the mouth of the Parana Guazu; the other Las Higueritas or Nueva Palmira, in the strait of the Uruguay, where is a pier and some coasting trade.

* The mariner when bound up, or loading in any of the rivers, should take into consideration the vessel's draught, and the probable rise and fall of the river, or he may be detained for months.

The great mouth of the Parana, known commonly by the name Guazu (great in Guarane), opens out into the Rio de la Plata at 12 miles N.W. of Martin Garcia, flowing from the westward ; all this western coast is formed by low marshy land covered with wood and impenetrable mangroves, and intersected by numerous channels which are so many branches by which this great river flows into that of the La Plata.

The Boca de Guazu is only about half a mile wide, but no shoal obstructs the entrance, the banks are steep, and there are 5 fathoms water very near the trees. The aspect of the Uruguay is altogether different from that of the Parana. In the lower part of its course between its mouth and Fray Bentos the river has the appearance of a lake which is about 90 miles in length and from 6 to 9 in breadth. It is here shallow, but a deep channel runs through the lake in all its length, enabling all vessels that can pass Martin Garcia to reach Paysandu, 150 miles from its mouth. Above Fray Bentos the river narrows rapidly to from 550 to 1,100 yards.

The right bank, Entre Rios, is generally low, wooded, and as monotonous as the low shores of the Parana, the land here and there ranging, perhaps, to 180 feet at the highest ; but the left bank, that of Banda Oriental, is composed of pleasant hills reaching occasionally from 200 to 500 feet high, broken by numbers of rivulets, with receiving houses from distance to distance connected with the estancias and villages, from which they export the produce of the country. The principal towns of Entre Rios are on the borders of the river, from whence the commerce of the province is carried to the Uruguay by the facilities of its affluents, the route to Buenos Ayres being much shorter than that by the Parana. This bank being low and drowned, the towns are from 6 to 9 miles in the interior standing on the banks of the rivulets by which they communicate with the Uruguay.

Vessels of light draught only can reach the town of Gualeguaychu. But at Concepcion de Uruguay large vessels can go to the distance of a cable from the quay. The navigation of the Uruguay is easy, as the current is not so strong as that in the Parana ; the channel is nearly straight, it does not change so often, and there are but few banks. Vessels of any size cannot go beyond Salto, as a chain of rocks interrupts the navigation at about 210 miles from the mouth of the river, and 65 miles above Paysandu. When the river is high, boats can pass above the rocks as far as the province of the Missions. The river is subject to periodical rises, occasioned by the great rain in springs in the Brazilian provinces, where it takes its source.

It rises in September and October, sometimes very rapidly, and in places where the river is narrow it attains the height of about 30 feet,

and above Salto 15 feet ; there are also occasionally rises at other times of the year. The prevailing winds are from the northward ; they generally follow the course of the river, as in the Parana. The place most frequented by foreign vessels is Fray Bentos, which serves as a port for Gualeguaychu. In this part of the river, which is 6 miles in breadth, the channel is very near the eastern bank ; it is necessary to cross to enter the little river of Gualeguaychu, leading to the town of the same name on its right bank.

This river is 5 or 6 miles in length, with a bar at its entrance ; vessels of light draught ascend when the water is a little above the average height, which is always the case when the wind is from the southward. The difficulty of communication renders the operation of loading and unloading very tedious. The produce is hides, tallow, bones, and jerked beef. The next port is Concepcion de Uruguay, situated a little below Paysandu. The little river of Concepcion admits vessels of light draught. Here is embarked all the produce of the estancias of General Urquiza, proprietor of the largest part of the runs for cattle of Entre Rios. A regular weekly communication is established between Buenos Ayres and the principal towns of the Uruguay as far as Salto.

THE RIVER PARANA rises in Brazil, north-west of Rio de Janeiro. The upper streams of this river have various names ; but at the confluence of the rio Grande, the longest of them, with the Paranahiba, it takes the name of Parana, which it retains till it merges itself into the Rio de la Plata. The Parana flows southward, receiving several large affluents, and separates Paraguay from Brazil and La Plata. It then turns to the west, and flows in that direction for 50 miles, still forming the boundary between Paraguay and La Plata. It receives the Paraguay from the north, and at 13 miles to the south-west, at Corrientes, it again turns south and flows through La Plata into the river of that name.*

The total length of the Parana is about 2,040 miles,—namely, 500 from the source of the rio Grande to its confluence with the Paranahiba, 1,000 from thence to the union of the Paraguay and Parana, and 540 from that point to the Rio de la Plata. In all the upper part of its course, as far as the province of the Missions, the river flows through a mountainous country, between scarped and tortous shores, which renders it unnavigable. But below the Salto d'Apipe, the highest point a vessel can reach, and during its course in the Argentine Confederation, the aspect and nature is quite opposite.

The right shore of the river is then formed by the immense low marshy

* See Charts:—Parana River, from the Boca de Gauzu to Corrientes, in 3 sheets, No. 1,982, scale, $m = 0.8$ of an inch.

plains of the desert of Chaco, which are nearly always inundated at each rise of the river ; it is cut into a multitude of islets, covered with wood and high grass, which renders it unapproachable. The left shore is generally formed by little cliffs of from 30 to 65 feet high, named *barrancas*, and which is the termination of the undulating ground of *Entre Rios*. In descending the river in the Argentine Confederation, the first ground a little elevated on the right bank is the *barranca de San Lorenzo*, near *Rosario*, and the last high ground on the left bank is *Punta Gorda*, or *Diamante* (above the town of *Parana*), where commences the delta of the river and the many channels by which it enters the *Rio de la Plata*.

The breadth of the *Parana* is extremely variable, following the nature of its banks. In the upper part of its course, until in the province of the *Missions*, it runs between high banks, and its breadth does not exceed from 450 to 550 yards ; but after leaving *Corrientes* it acquires an average breadth of from one to 3 miles ; sometimes in the great rise the breadth extends many miles, and the animals of the desert, deers and tigers, surprised by the inundation, traverse the river to seek refuge on the hills of the shore of *Entre Rios*. [Great changes then take place in the configuration of the river ; new islets are formed, and others carried away by the current, and there is often great difficulty in finding the route. In the upper part the bed of the river is composed of rocks, but below *Corrientes* it is of shifting sand, and sometimes with a little clay.

The *Parana* and its affluents are subject to a periodical rise, which then permits vessels of $14\frac{1}{2}$ feet draught to reach *Corrientes*, and those of 8 feet draught the Brazilian province of *Matto Grosso*, in lat. 18° , at about 2,000 miles from the sea. The rise or swelling of the river is produced by a double cause ; the melting of the snow on the *Cordilleras*, whose water descending to the *Parana* by its affluents from the westward, and by the great rains which fall at nearly the same time in the Brazilian provinces, reaching the *Parana* by its affluents from the eastward.

In the lower part of the river the water rises occasionally when the wind blows strong from S.E., which forces it back ; but this rise lasts only while the wind is from that quarter, as it falls again when it veers to northward or westward. During the low state of the river in 1856 the sand banks forming the port of *Parana* were uncovered 5 feet. During the rise of 1858 the water rose to the level of the quays at *Corrientes*, inundated the French colony of *San Juan*, and nearly ruined it. In the navigable part of the *Parana*, from its mouth to the province of the *Missions*, the average strength of the current is about $2\frac{3}{4}$ miles an hour ; it is most rapid in the narrows, and where it runs along by the high cliffs, and on the contrary weakest when it flows between low inundated banks.

The only town of *Parana* where vessels with foreign commerce have

much interest is Rosario, at 160 miles above the Boca de Guazu. In 1858 more than 200 European vessels anchored in this port, and in the first half of the year there were 110 vessels, amounting to 22,344 tons, of which 9,930 were English. Above Rosario there is nothing in the river to interest the commercial stranger.

It would be difficult to give any specific directions for the navigation of the Parana, where in places the channels vary much every year. There are many islands formed where deep water was found years ago, and there are now deep and good passages where none formerly existed. It requires constant practice, care, and great attention in navigating this river. Hands should be kept by the anchor, and attention paid to the lead. It is navigable for a steam vessel of 13 feet draught for a considerable distance at all times of the year. A vessel should anchor at night in a broad part of the river, where the current is not so strong, and the banks more shelving than in the narrow parts. When going against the stream, should the vessel pass the land at a rapid rate, she will be out of the channel. Avoid rushes, ripples, and smooth patches; whenever the river takes a sudden turn, open the reach before entering; and in case of a doubtful passage the seaman will know best how to act.

Keep nearer the upper than the lower bank; for should a vessel get ashore on the upper bank, she can easily haul off; but if on the lower bank, a bower anchor must be laid out up the river, and the cable hove taut, when, after a few days, the bank will wash away, and the vessel will float in most cases without being strained the least. If a vessel takes the ground in ascending the river, she is easily got off again, but in descending, if she once touches, she remains fast. It is very common to hang an anchor astern in descending the river, to let go the moment the vessel touches the ground.

The only part of the river a vessel can navigate at night without great inconvenience is between the Boca de Guazu and Rosario, the shoals being few in number and the route easy to follow, but the descent at night is always dangerous, and should not be attempted unless in cases of urgent necessity. Sailing vessels cannot navigate at night.

The anchorage at Rosario is in from 12 to 15 fathoms water at a cable from the shore. The current here is about 3 miles an hour. A vessel may haul alongside the wharf. When the river is falling at Parana, there will be no perceptible change at Rosario. The average speed of a steam-vessel in ascending the river is about 6 knots, and in descending 11 to 12 knots.

Vessels of 12 or 13 feet draught can navigate as far as Paraguay, but those above that draught cannot proceed farther than the passes of San Juan

at some distance above La Paz. Vessels of about 15 feet draught, and in general all those that can pass Martin Garcia can reach Rosario; but above this point it becomes difficult for sailing vessels; steamers and coasters only can go higher up. Throughout the year vessels drawing 10 feet can go as far as Parana; the only doubtful passage is some miles below Parana.

When the water is low it is navigable to Corrientes for vessels of about 7 feet draught, and for vessels of smaller draught to the Salto d'Apipe, 135 miles farther on, in lat. $27^{\circ} 30'$, where the last rapids occur. It has a low and high season, depending on the periodical rains; the former is said to last during the winter and spring of the southern hemisphere, from June to December, and the latter during the summer and autumn; but the difference in the height of the river in these seasons varies at different times, and in different parts. The thermometer at Parana is lowest in June and July, when it rises after sharp frosts in the morning from 30° to 56° . The hottest months are December and January, when the thermometer ranges from 95° to 54° .

THE RIVER PARAGUAY, the principal affluent of the Parana, issues from several lakes in the Sierra Diamante in Brazil, at the height of 1,020 feet above the sea, in about lat. 13° S., long. $55^{\circ} 40'$ W., and flows southward in a right line for 850 miles, but taking into account its detours, it is little less than 1,400 to 1,500 miles; it traverses the great marsh of Xárays in all its length, and falls into the Parana a little above Corrientes 800 miles from the sea, separating La Plata from Brazil and Paraguay. Its whole length from its source to 13 miles north-east of Corrientes is about 1,890 miles.*

The height of the river above the level of the sea at Asuncion is 253 feet, and at its sources in Matto Grosso 1,000 feet. The breadth in the lower part of its course near Asuncion varies between 220 and 550 yards. Its bed is much more regular, and less encumbered with sand banks and islets, than that of the Parana. It is composed of sand and sometimes of clayey mud, the bottom is rocky only northward of about lat. 23° , but there are some isolated rocks in the vicinity of Asuncion.

The current is not so strong, but its windings are more sudden and numerous; between Asuncion and its embouchure it runs at the rate of 1.6 knots an hour.† The navigation of the Paraguay is much more easy

* See Charts: Paraguay, Sketch of the River from Corrientes to Villa Franca and to Asuncion, Nos. 2,444, 2,445, scale $m = 0.15$ of an inch; Oliva to Rio Paraguaymi, to Concepcion, and to lat. $21^{\circ} 40'$ S. Nos. 2,594, 2,595, 2,596, scale, $m =$ one inch.

† Lieut. Day in 1853, says, we found the current running about 3 knots, but stronger, in the lower part of the river below the rio Vermejo; and when we came down in March, the river being high the stream was running 4 knots.

than that of the Parana, especially for steamers. The depth is very variable; it is greatest at Humaita, where there are from 22 to 27 fathoms water, and least at the passes of Laguna, Villeta, Lambaré, &c., &c., and where at times there are only about 5 or 6 feet water.

The two banks of the Paraguay are in general of the same aspect, having the same small cliffs of the average height of about 6 to 13 feet, which are broken by a number of rivulets from the marshes. They are equally wooded and covered with vegetation, and more so than the shores of the Parana. Hard dry wood suitable for steam vessels to burn may be procured by cutting, particularly on the Chaco side. Great numbers of carpinchos * different species of deer, large numbers of caimans, birds of the marsh, &c. are seen.

The right shore, that of Chaco, is completely deserted, but frequented by divers tribes of indians from the interior. The left shore, belonging to the Republic of Paraguay, has from distance to distance at the average of a league and in all turns of the river, little military posts with a watch house on a high pole, from whence are signalised all new arrivals. In these watch houses the men find protection from the myriads of mosquitoes, which never rise from the ground. The cavaliers are always ready to carry to the capital any news which may be interesting to the Government.

The Paraguay like the Parana has periodically rises, but the time is a little different. It commences to rise towards the end of February, and continues until June, when it falls. Its rise is very irregular, sometimes the high river taking place of the low one until within 90 miles of its mouth. When the Paraguay is very low, the Parana on the contrary is very high, the waters of the latter river then force back that of the Paraguay. The difference of level between low and high water is also very variable; it is on an average about $9\frac{1}{2}$ feet, but it is sometimes nearly 14 feet, as in 1859, when an extraordinary rise overflowed the banks of the Paraguay, and occasioned great loss to the inhabitants.

During the average rise, vessels of $12\frac{1}{2}$ feet draught can reach Asuncion; those of about 9 feet draught can reach it the greater portion of the year; but during low water those only of less than $6\frac{1}{2}$ feet can reach it. In favourable seasons, vessels of about 7 feet draught are able to go as far as the mouth of San Laurent or Cuyaba, and those of less than 5 feet draught, can reach the town of the same name in lat. 17° S. The only difficulty is the narrowness of the river, the number of its détours, and the rapidity of the current.† The small Brazilian war

* Carpinchos are about the size of our pigs, and their flesh is of fair taste, but they are reputed as being very unhealthy.

† It is stated, that in the river Cuyaba, the current runs 5 or 6 miles an hour, but this account appears to be exaggerated.

steamers have made their voyages pretty regularly. In 1857, the first steamer reached up. The distance by water of the Cuyaba from the sea is from 2,100 to 2,200 miles. It takes six weeks for a steamer to reach it, and six months for a small sailing vessel.

The navigation of the Paraguay is easy, and can be made, if necessary, without a pilot, because there are but few shoals in the middle of the river, and as they are rocky and covered with sand they do not shift as in the Parana, all the sand is deposited near the points. In going up or down the river, keep at a little distance from either bank, and on arriving near a point, steer for and along the opposite bank, observing the same precaution as given for the Parana. If any doubt exists about the direction of the channel recourse should be had to sounding in a boat, of which there will be no difficulty. The only town of Paraguay open to the commerce of strangers is Asuncion, the capital of the republic; foreign vessels are not allowed to remain at other ports.

At about 50 miles from the mouth of the river is the town of Pilar or Nembucu, where pilots may be obtained. This town is small, clean, and regularly built; it consists of about half a dozen streets at right angles to each other, and the houses are low, neatly thatched, and white-washed, each standing on a small enclosure shaded by orange trees. Off the flag-staff at the captain of the port's house, is a shoal of rock and sand, with 6 feet water on it, and $4\frac{1}{2}$ fathoms close to it. It is necessary to keep well over on the western shore close to the north point of the island, where there are $3\frac{1}{2}$ fathoms water.

From Pilar the channel is deep and winding, the scenery pretty, with occasionally large patches of cleared and cultivated land as far as Asuncion. The best anchorage at Asuncion is close to the shore in 3 fathoms water, with the flag-staff at the captain of the port's house S.E. $\frac{1}{2}$ E., distant about $2\frac{1}{2}$ cables. Here a vessel will be clear of those going in and out, and the ground is good for holding. Farther out the bottom is rocky, and an eddy causes vessels to swing round their anchors. Large floating green islets are constantly brought down by the current, and give much trouble by getting across the bows; they are large enough to support several men.

The town of Asuncion is a little back on rising ground. It is of some extent, irregularly built, and in 1853 contained a population of 17,000, but scarcely any foreigners, only two Englishmen, one American, and about the same number of French and Italians. The country for 20 miles around is hilly and well cultivated with coffee, maize, tobacco, sugar cane, &c. Woods of all kinds, many very durable and well adapted for ship building, are found in the forests.

The rules of the police and custom house are harsh and exacting to

strangers. A bi-monthly Paraguayan steam vessel has established rapid communication between Buenos Ayres, Rosario, Parana, Corrientes, and Asuncion ;* there is also a Brazilian steamer monthly to Coimbra in Matto Grosso ; and others frequently running between the above intermediate ports. These steamers navigate the river day and night ; they are of small draught and have excellent pilots.

The Parana is lowest in the month of December. It rises in January, February, and March. In April, May, and June it is high and apparently steady. In July, August, and September it falls and rises irregularly. In October the great fall commences, and in 1861 it fell slowly at Parana until the 26th December, at from one to four inches in 24 hours. It commenced rising on the 27th and continued on an average of about one inch in 24 hours. The difference between high river and a low one is about 12 feet ; but it is irregular and varies considerably, depending much on the quantity of rain that falls in the Brazilian provinces, and the melting of the snow on the Andes, as the following table shows. In November 1860, the least water in the passes below Asuncion, was 16 feet, whilst in December 1861 the least water was about 8 feet.

A table showing the daily average height of the river in feet above the level of the lowest water in September 1856, as observed at Parana for the several months in the following years :—

—	1857.	1858.	1859.	1860.*
January - -	- -	- -	14 $\frac{3}{4}$	—
February - -	11	- -	16 $\frac{1}{2}$	—
March - -	- -	- -	12 $\frac{1}{2}$	14
April - -	13	- -	- -	12 $\frac{1}{2}$
May - -	- -	17	14 $\frac{3}{4}$	—
June - -	11 $\frac{1}{2}$	- -	14	—
July - -	13 $\frac{3}{4}$	- -	9 $\frac{1}{2}$	—
August - -	9 $\frac{3}{4}$	12	- -	—
September - -	7 $\frac{1}{4}$	- -	- -	—
October - -	15 $\frac{1}{4}$	- -	- -	—
November - -	15	- -	- -	—
December - -	13	15 $\frac{1}{4}$	5 $\frac{3}{4}$	—

* The most progressive of all the provinces is Corrientes, where immense cotton plantations are going on, and the government is doing everything possible to foment the production. In Santa Fé there is a good deal of cotton planting also going on. The works of the Central Railway Company are progressing, and business in Rosario is rather brisk. In Entre Rios sheep farming is rapidly on the increase, and foreigners are settling down fast in this province.—1863.

The following table is from the mean of several passages in H.M.S. *Ardent*, 1861, carefully deduced by Thomas Aylen, master.

Names of Places.				Time in Hours.	Distance in Miles.
From	Buenos Ayres	to	Farallon islet	2½	18
"	Farallon	to	Martin Garcia	3½	27
"	Martin Garcia	to	the Boca de Guazu	2	14
"	Boca de Guazu	to	San Predo	13	103
"	San Pedro	to	Obligado	1½	11
"	Obligado	to	St. Nicholas	5	40
"	San Nicholas	to	Peidras	1½	11
"	Peidras	to	Rosario	4½	40
"	Rosario	to	Collegio of San Lorenzo	2¾	23
"	San Lorenzo	to	Diamante	9	70
"	Diamante	to	Parana	7	46
Total				-	403

Table of river distances, by M. Mouchez, of the French Imperial Navy,
Capitaine de Frégate.

Rivers.	Places.				Miles.
PARANA.	Buenos Ayres	to	the mouth of the Parana	Guazu	52
	"	"	San Pedro	-	150
	"	"	Saint Nicholas	-	185
	"	"	Rosario	-	218
	"	"	Town of Parana	-	310
	"	"	La Paz	-	392
	"	"	Goya	-	517
	"	"	Bella Vista	-	566
	"	"	Corrientes	-	635
	"	"	Salto de l'Apipe	-	780
	"	"	Salto de Guayro	-	1,070
PARAGUAY.	"	"	mouth of the Paraguay	-	653
	"	"	Humaita	-	676
	"	"	Nembucu	-	701
	"	"	Asuncion	-	865
	"	"	Villa de Concepcion	-	1,014
	"	"	Rio Apa	-	1,136
	"	"	Pan de Azucar	-	1,192
	"	"	Coimbra	-	1,335
	"	"	Albuquerque	-	1,377
	"	"	mouth of San Lorenzo	-	1,539
URUGUAY.	"	"	mouth of Rio Cuyaba	-	1,623
	"	"	Port Cuyaba	-	1,873
	"	"	Fra Bentos point (opposite the Rio	Guauguay)	105
	"	"	Concepcion del Uruguay	-	156
	"	"	Paysandu	-	168
	"	"	Salto	-	220

CHAPTER VI.

SOUTH COAST, BANKS, CURRENTS, AND WINDS OF THE RIO DE LA PLATA.

VARIATION from 9° 25' East to 10° 55' East, in 1864.

THE south bank of the Rio de la Plata is low, uniform, and uncultivated ; it is only visible from the offing by groups of trees which are scattered along the coast, making the navigation near it difficult. The coast is the termination of the pampas of Buenos Ayres, immense monotonous plains, resembling the deserts of Africa, which extend to the chain of the Cordilleras, rising 420 miles to the westward. There is no other vegetation than the rare ombu tree,* and no water but that of the marshes formed by the rain.

The only inhabitants are a miserable tribe of indians, who come a great distance from the south-west to pillage the estancias or farm houses situated on the frontiers of the province of Buenos Ayres. The complete absence of running water, and the saltiness of the marshes produced by the great quantity of salt which is everywhere found on the soil, renders this country uninhabitable. These immense plains therefore will probably remain a long time deserted.

CAPE SAN ANTONIO.—Rasa or Flat point, the northern extremity of the ill-defined cape San Antonio, is a low sandy spit, extending to the northward and under water towards some breakers, near the northern limit of the Tuyu bank. Near the point, a little in the interior, a chain of sandy downs commence running to the southward, increasing progressively in height to Medano point, where they are from 65 to 80 feet above the sea. The coast is of light colour, with occasional tufts of stunted brushwood, and in clear weather this part of it may be seen from a distance of 8 or 10 miles.

THE TUYU BANK, called also Arenas Gordas, extends nearly 10 miles from the shore, and prevents even the smallest vessels from approaching

* Mr. Thomas W. Hinchliff, M.A., F.R.G.S., in his travels in Buenos Ayres, 1863, says "The ombu is a peculiar tree, of rapid growth and dense foliage, with a huge trunk little better than elder-pith, and bark very like an elephant's hide, but in the midst of the dusty burning plain, offering to the parched and weary traveller rest and shelter from the scorching blast of the Pampero, beyond all price. No wonder that when the ombu himself at last falls to the earth before the storm, in his old age, 'he dies really and universally lamented.' Happy ombu." See also page 171.

this half-drowned land. The sea breaks on it at one mile from the shore, and on the north part of it, when the wind is from seaward. The ground near, and even on the bank, is extremely soft, the depth decreases gradually, and with the lead going there is no danger.

SAN BOROMBON BAY, formed between Cape San Antonio and Piedras point, 55 miles to the N.N.W., is about 20 miles deep, and very shallow. The coast along the southern part of the bay is nearly level with the sea, and can only be seen by the stunted brushwood scattered here and there. It is only northward of lat. 36° S., where it rises a little, but not exceeding 20 feet, that it is at all visible from the offing.

CURRENTS and TIDES.—The currents set into or out of the Río de la Plata, varying in their strength and duration as the winds vary, by which they are principally governed. Generally speaking the current sets to the northward about N.N.W., at from one to 3 miles an hour, before and during southerly winds; and to the southward about S.S.E., at the same rate, before and during northerly winds.

When there has been an unusual flood in the inland countries, and the sea is at low ebb, or when the sea spring tide is unusually high, and the river is the reverse, the current may set round Cape San Antonio at least as strongly as it has been known to run past Lobos islet, on the northern side of the entrance to the Plata, at the rate of 5 or 6 miles an hour. These, however, are extreme cases, of rare occurrence.

It is high water, at full and change, off the cape at about 10 h.; and the rise is about 6 feet. In fine weather the tides are regular, but with strong winds from the S.E. quarter, the water rises about 3 feet above the ordinary springs, and it falls with the winds from the N.W. quarter.

SOUNDINGS.—At the distance of 12 miles E.S.E. from Cape San Antonio there are $8\frac{1}{2}$ fathoms water, over fine sand mixed with mud and broken shells; at 9 miles east of the cape, 7 fathoms, muddy sand; and at 5 miles E. by S. $3\frac{3}{4}$ fathoms, muddy sand. Along the coast southward of the cape, at the distance of 10 miles, there is in general from 8 to 10 fathoms water, fine sand, but in approaching it the depth diminishes regularly and the sand becomes a little mixed with mud. In the offing at 35 miles East of the cape, there are 9 fathoms, sand and mud. Vessels of moderate draught may approach the cape to a distance of 3 or 4 miles.

The COAST.—At Rasa point, which forms the south-eastern extreme of San Borombon bay, the low flat shore turns suddenly to the westward, forms a right angle, changes also a little in nature, and terminates suddenly, but so low that the beach of sand and shingle is almost blended with the sea. Close to the westward of the point is the mouth of the little river Tuyu, communicating with several lakes, having 2 fathoms water at its entrance.

A channel trends through the Tuyu bank, by which a vessel of very light draught can approach and enter the river. The channel is difficult to find, and at present of no consequence ; but in a few years its position may be changed, so soft and yielding is the ground through which it passes. At $3\frac{1}{2}$ miles westward of the Tuyu is the mouth of another little river named Arroyo del Arenal, from the sand which forms its banks.

At 5 miles farther to the westward is the Arroyo de la Isla ; its eastern bank is drowned and inaccessible. The water in these little rivers, as well as that in all the rivers of this country, is very salt.

The first remarkable group of trees, named Isla del Juncal, rise about two-thirds of a mile from the shore in lat. $36^{\circ} 1' S.$; about 7 miles to the northward is the Isla del Rodeo, another group in lat. $35^{\circ} 54' S.$, and 8 miles southward of the mouth of the rio Salado. Vessels of less than 9 feet water will find convenient anchorage off Rodeo, at 2 miles from the shore, in 10 feet water over soft mud. Although not sheltered from the eastward, the winds from the offing never raise much sea.

MOUNT ROSAS, a sandy down a little higher than the surrounding land, covered with trees, rises in lat. $35^{\circ} 49' S.$ to about 30 feet above the sea. The village of Pampas formerly stood on its summit, the ruins of which still remain. With a red brick-kiln, about 20 feet high, northward of it, and $2\frac{1}{2}$ miles S.S.W. of the rio Salado, it is a good mark for that river.

RIO SALADO.—The Salado is a shallow bar river, unfit for any but small vessels. At times, when the Plata is high, there are 6, 8, or 10 feet water on the bar. But at other times the smallest boat cannot even approach the mouth of the river ; and the mud is so soft that one cannot walk from the boat, aground, to the firm land. There are a few houses near the Salado. The entrance of this river will be known by the red brick-kiln and Mount Rosas, southward of it. The coast northward of it is 14 to 20 feet above the sea. At one mile from its mouth, vessels under 10 feet draught will find good anchorage similar to that of Rodeo ; large vessels cannot approach the coast nearer than 6 or 8 miles. Off the mouth of the river, at this distance, there are 20 feet water, soft mud.

TIDE.—It is high water at the rio Salado, full and change, at 10 h. 45 m. ; and the rise is 6 or 7 feet.

The RIO SAN BOROMBON, at 5 miles northward of the mouth of the Salado, is a small stream, and often dry, but which has a large quantity of water during south-east winds.

MOUNT JUAN GERONIMO.—Between the Rio San Borombon and Piedras point north of it, is a chain of small sandy downs, on which some

trees are seen. The most remarkable is $6\frac{1}{2}$ miles southward of the point, named Mount Juan Geronimo ; at one mile from Piedras point is another smaller one, known by the name of Isla de la Observacion.

PIEDRAS POINT is the north extreme of San Borombon bay, and the south point of entrance to the Rio de la Plata. The point is low, and projects very little ; it is composed, not of rocks, as its name implies, but of *tuf*, a species of friable compact sandstone, and appearing to be of hardened mud. This stone, known in the country by the name of *tosca*, is formed in various places on the coast as far as Buenos Ayres, and forms a girdle of dangerous banks of 5 to 6 miles mean breadth. It is as dangerous to vessels which ground on it as the rocky bottom of the opposite shore.

The banks which border Piedras point to a distance of 8 miles, and the low nature of the shore, require the navigator to use the utmost caution in approaching the coast. Certain directions refer to stunted trees as marks, but they are uncertain and too often disappear. Coasters and pilots alone can avail themselves of them.

PIEDRAS BANK.—Piedras point, and that of Indio about $11\frac{1}{2}$ miles to the north-west of it, is bordered by a bank of tuf and coarse gravel of from 6 to 8 miles in breadth. At 11 miles from the shore there are only 16 feet, and in advancing towards the offing the bottom becomes soft mud, which extends into San Borombon bay. The bank extends along the coast to the north-west at the distance of 7 or 8 miles, gradually narrowing towards the bay of Barragan, where it terminates. At one mile from it there are 20 to 23 feet water, over mud.

In approaching it from the northward or eastward the bottom becomes hard and the water shoals gradually ; but in coming from the southward the bottom is less hard and the water shoals more rapidly. When very near the edge of the bank, the Cerro de Salvador Grande, on which are some trees, the Isla de la Observacion, on which is a remarkable isolated tree, and the Isla del Espenillo, situated more than 2 miles to the south-west, can be seen.

In estimating with the eye the distance from the coast, great errors are likely to be made ; more so when in the La Plata, from the frequent effects of the mirage and extraordinary refraction, which lower and raise considerably the objects in view near the horizon.

The COAST.—Memoria point, low and a little projecting, lies N.W. by N. 7 miles from Piedras point, and near the Cerro de Salvador Grande. At about 5 miles farther on in the same direction is Indio point, and so low that a vessel can rarely close to recognize it. The pilots, however, often mistake it for the Cerro de Salvador Grande.

Aizpurua in 1826 says :—"Indio point is low, covered with brushwood,

more rugged than the rest of the coast, and on its extremity is a large tree. To the south-east are two groups of trees, and between them and the point is seen an uncultivated plain. The point may be seen in clear weather from a distance of 9 miles in $3\frac{1}{2}$ fathoms water. In coming from the north-east and east, it may be more readily known by the soundings; the bottom from soft mud will become hard mud, and the lead will stick. At intervals there is tuf, when the water will shoal a little. The vessel's draught and the state of the river must be taken into consideration in approaching this point.

Having passed the point, some large trees on the hillocks and separated from each other will be seen between Magdalena and Atalaya point. It is difficult to make out the different points, as they only slightly project, and the coast cannot be approached on account of the banks which border it. By night it is necessary to navigate with the greatest care when near this point, as the currents are stronger than in any other part of the La Plata, and the ebb tide sets on to the bank." From Indio point the low shore runs to the north-west for about 22 miles to Embuda point.

LIGHT VESSEL.—Between Indio point and the Ortiz bank, a vessel painted red, with three masts, having a black ball at the foremast head, is moored in $3\frac{1}{2}$ fathoms water, at the distance of 8 miles N.E. $\frac{1}{8}$ N. from the point, and 9 miles S. by W. $\frac{3}{4}$ W. from the south-east part of the Ortiz bank. The vessel exhibits at the height of about 30 feet above the sea, a *fixed* white light, visible 6 or 8 miles. When pilots are on board a red and white diagonal flag is hoisted.

MAGDALENA.—When to the north-west of Indio point, the three first ombus seen are in the precincts of Magdalena, and farther on the little village and church (having a large round white dome) of that name will be seen rising from a group of five or six others.

EMBUDA and ATALAYA POINTS.—In front of Magdalena is a slightly projecting point with trees on it, named Embuda. To the north-west of Magdalena church is an ombu with a small group of trees, and a little farther on a group of three others. Those seen to the westward form the largest group, and those in the middle the smallest. Atalaya point, at 11 miles to the north-west of that of Embuda, is low and sandy, and will be known by two small clusters of underwood on the shore, and an ombu with two houses. This point should be approached with caution, as it is stated the coast bank extends some distance from it.

The point is formed by the mouth of the Arroyo de Atalaya, which small boats only can enter. At about 14 miles farther to the north-west is Santiago point, at the entrance to Barragan bay. There are seven poplar trees at about $1\frac{1}{2}$ miles to the eastward of this latter point.

BARRAGAN BAY.—At the termination of the low coast, the wood of Santiago de la Ensenada de Barragan commences, and extends westward nearly 19 miles. The bay or inlet is open to the W.N.W. Santiago, the eastern point, is very low, covered with trees, and shoals for three-quarters of a mile to the westward where are only 7 feet water, which narrows and renders the entrance so winding as to make it necessary to employ a pilot. The channel is about a cable in breadth, with only about 7 feet water, but 13 feet and more can be carried in when the water is high. The bay was formerly deeper and more frequented, but from the accumulation of mud the water is shoaling daily; its shores on either side are swampy, thickly wooded, and intersected by numerous creeks. In the middle of last century large vessels unable to go to Buenos Ayres entered this bay. At that time there were about 16 feet on the bar at low water, and 6 to 10 feet where the ground is now dry.*

DIRECTIONS.—The approach to Barragan bay is known by the trees on Santiago point and by Lara point on the western side being thickly wooded. In 1863 a wreck with one mast standing lay N.N.E. distant one mile from the latter point and was a guide to vessels approaching from the westward; it was seen at a distance of $3\frac{1}{2}$ miles. When entering the bay from the eastward, pass Santiago point at the distance of three-quarters of a mile in 13 feet water; then steer S.W. $\frac{1}{2}$ W. for about 2 miles or until a solitary hut a quarter of a mile westward of a remarkable clump of trees, bears South distant three-quarters of a mile; when steer S.E. $\frac{1}{4}$ E. for a conspicuous poplar tree on the south side of the bay until the hut bears S.W. $\frac{1}{4}$ W.

An E. by S. course, making allowance for the current which sets $2\frac{1}{2}$ miles an hour with the ebb, will lead into the inner anchorage, where vessels may lie in 2 fathoms, mud, and smooth water in all weather. Coming from the westward pass Lara point at the distance of half a mile; then steer S.E. $\frac{7}{8}$ E. along shore at the same distance until the hut bears South three-quarters of a mile and proceed as before.†

TIDES.—It is high water at Barragan bay, full and change, at 7 h.; and the rise is from 5 to 9 feet.

LARA and QUILMES POINTS.—Vessels bound to Barragan bay for mules, anchor 2 or 3 miles from it, near Lara point, where there is shelter from S.E. winds, but it is necessary to be under way with those from the N.E. Lara point is a little higher than the surrounding coast,

* It is said to be in contemplation to construct piers at this port, at which vessels may discharge and load; and to connect them by rail with Buenos Ayres.

† Mr. Fred. Hunter, second master of the *Doterel*, 1863.

and remarkable by a large isolated ombu. A little westward of the point is a cluster of underwood, and some hillocks forming the land of Quilmes point. Before passing this latter point, the rising edifices of Buenos Ayres and the vessels at anchor in the outer road will be seen. Between Barragan bay and Buenos Ayres the low grassy shore is partly inundated with a very high river, and cannot be approached nearer than 2 or 3 miles.

Las PALMAS BANK.—The flat of Las Palmas is a great bank formed by the sand brought down by the Uruguay and the Parana, which spread over the whole of the upper part of La Plata. The depths over its outer part are from $2\frac{1}{4}$ to $2\frac{3}{4}$ fathoms, over its inner part from $1\frac{1}{4}$ to $1\frac{3}{4}$ fathoms, and shoaling still more near the mouths of the great rivers. Vessels leaving the outer road of Buenos Ayres for Colonia or the Martin Garcia channel, should take into consideration the vessel's draught and state of the river, and steer to the eastward, borrowing either way towards the edge of the flat according to circumstances.

BUENOS AYRES, the capital of the province of the same name, was founded in 1535, and stands on the right bank at the head of the estuary of the Rio de La Plata, on a vast plain which is here about 35 or 40 feet above the sea, and which extends westward to the Andes. The level uniformity of its outline is only broken by the spires of various churches. The streets are regular and straight, intersecting each other at distances of about 150 yards, forming squares like a chess-board. The houses have never more than two storeys, and commonly only one.

The cathedral has a handsome dome, and a portico with twelve Corinthian pillars. There are several churches, including an English one, and a Presbyterian chapel. From San Miguel tower, 68 feet high, a little westward of the cathedral, the true bearing of the north Cerro de San Juan on the Banda Oriental coast is N. $39^{\circ} 41' 34''$ E. There are two wharfs or piers, from 220 to 330 feet in length, the first, near the church of la Merced, for passengers, the second in front of the custom house, for merchandise, but they are not long enough, and inconvenient when the river is low from N.W. winds.*

Buenos Ayres has a considerable trade. Its imports are manufactured goods, cottons, earthenware, gunpowder, hardwares and cutlery, iron, leather, linens, oil, linseed, woollens, &c.; and the exports are bones, copper unwrought, grease, horsehair, hides, horns, skins of various kinds tallow, tobacco, wool, &c. The value of the imports from Great Britain alone, in the year 1860, was £1,782,447; and that of the exports

* See Plan :—Buenos Ayres Roads, No. 2,526, scale, $m = 2.0$ inches.

£1,101,428. All kinds of supplies including coal, but excepting meat, are at a very high price.

LIGHT.—At $4\frac{1}{2}$ miles N.E. by E. $\frac{1}{2}$ E. from the custom house at Buenos Ayres is a hulk or stationary guard ship, painted black with three masts, which shows a *fixed red light*, visible 6 miles.

OUTER ROAD.—There are two anchorages in front of Buenos Ayres, formed by the City bank and that of the Camaron, an extension or tongue of the great Palmas flat. Both are anchorages exposed to the winds from S.E. to E.N.E., which often bring in a heavy ground swell; vessels frequently drag, foul each other, and sometimes go on shore. It is necessary to have good ground tackling, to be cautious not to ground on the anchors, and to give a berth to the buoys of vessels in the road to prevent grazing on their anchors. The bottom is a fine dark sand; within the 12 feet line of soundings it is generally hard, and to 15 feet hard and soft, beyond 15 it is mostly soft muddy sand. There are always a large number of vessels lying here.

There are several dangerous sunken vessels in the roads; two nearly close together, showing at low water, lie in the outer road in line with the Catalina channel, and one farther in, and are marked by beacons. The great or outer road northward of the City bank, at about $3\frac{1}{2}$ miles from the shore, is from 3 to 4 miles in length in a north-west and south-east direction, and from a half to three-quarters of a mile in breadth, with depths of 18 to 21 feet over soft mud. At the entrance to this anchorage there is a bar or flat with only 15 feet water on it at the mean level of the river, and at times not more than 12 feet, which obliges vessels of moderate draught to anchor at 6 or 7 miles from the town in 17 feet water, with the Residencia in the southern part of the city bearing S.W. by W.

The domes of the churches and the vessels at anchor in the outer road are seen at a distance of 10 or 11 miles. The bottom on the City bank or that southward of the outer road being hard, it is necessary to keep a little to the northward. Having passed the bar, the soundings slowly increase, and the bottom becomes softer; when in 17 feet water, soft mud, steer to the westward, and anchor in about 20 feet, with the guard ship bearing S.E. by E. $\frac{1}{2}$ E., distant $2\frac{1}{4}$ miles; la Residencia S. by W. $\frac{3}{4}$ W.; the custom house S.S.W. $\frac{1}{2}$ W.; and the church of la Recoleta, north-west of the town, S.W. $\frac{3}{4}$ W. A good berth will also be found near the sunken vessels, where the water is deepest and the position convenient for boats. It is not usual to moor in the outer roads, but to veer a long scope of cable, and be ready to drop a second anchor with south-easterly winds.

INNER ROAD.—The inner or little road off the north-east angle of the city is a space of about $1\frac{1}{2}$ miles in length, in a N.N.W. and S.S.E. direction, and about 3 cables in breadth, having 12 and 13 feet water. It

is formed between the City bank and the coast, the latter is bordered with a bank of rotten stone. To the northward of the inner road is the anchorage El Pozo, having about a foot more water. Vessels in the Pozo and inner road always moor N.E. and S.W., and great attention should be given to prevent grounding on the anchors, for frequently there are only 8 or 10 feet water, and vessels are often aground and unable to go to sea for 15 or 20 days. A large number of vessels are always here.

In proceeding from the outer road to this anchorage, steer N.W. by W. for about 2 miles, until a remarkable umbrella tree, west of the town and about one mile from the shore, is on with the north-west part of a grove of trees on the plain near the shore, bearing S.S.W. $\frac{3}{4}$ W.; or the church of Recoleta bears S. by W., then steer on either of these lines across the west part of the City bank over soft bottom, in from 10 to 13 feet water at the mean level of the river, until $1\frac{1}{2}$ miles from the shore; when about a S.E. $\frac{1}{2}$ S. course will lead to the anchorage. The depths of water over this part of the bank are about the same as elsewhere, but this track is chosen on account of the soft nature of the bottom.

The Catalina channel, south-eastward of the above, is a depression in the City bank, but the bottom is harder; it is much used by vessels under 10 feet draught. The leading mark through is a white house near Palermo Chico, a large white house with an arched piazza, in one with the umbrella tree, bearing S.W. by W. $\frac{3}{4}$ W. But as the banks are constantly shifting, it is necessary when going into the inner road to employ a pilot, and particularly for the purpose of choosing a clear berth, and avoiding the many lost anchors in the roads.

WINDS.—During summer, between August and March, the winds are from the eastward. About noon, if the barometer is in a mean state, it is generally calm or little wind, which freshens from the south-eastward towards sunset, when it blows fresh, veers to the northward during the night, and becomes calm again about noon. In April, May, June, and July, the weather is variable. The barometer always rises with a S.E. wind, which brings clear dry weather; falls for a pampero or S.W. wind, but falls lowest with the wind from North to West, which brings cloudy rainy weather. It may be fine weather at sunset, and two hours after blowing a gale, but the barometer is sure to indicate it.

TIDES.—It is high water at Buenos Ayres, full and change, at about 12 h.; and the rise may be from 3 to 5 feet. The flood runs 5 hours, and the ebb 7 hours, at from one to 2 miles an hour. In fine weather the tides are generally regular, but with a fresh breeze they are in a measure irregular. The winds from the S.E. cause the water to rise, and those from the N.W. depress it, and in some places cause a difference of 12 feet. A case has occurred when the wind from the N.W. has so depressed the

water, that a person was able to walk dry to the vessels anchored in the inner road.

RIO RIACHUEL.—At about a mile southward of the town is the little river Riachuel, with 13 to 16 feet at low tides, over soft mud, which serves as a port of commerce to Buenos Ayres. This river being the deepest on the south coast, was the cause of the town being placed on the neighbouring plain. Its mouth is obstructed by banks, so that vessels drawing less than 10 feet alone can enter when the water is high from the S.E. winds, 3 feet only being on the bar at low tides. Large numbers of coasters here load and unload. The banks of the river are occupied by workshops, magazines, and saladeros, where are prepared all the products of the country for exportation, consisting of wool, hides, tallow, &c. The saladeros are principally established at Barracas, a little village 2 miles above the mouth of the river.

The COAST.—From Retiro point, at the north-east angle of Buenos Ayres, the shore forming the bay of Olivos runs to the westward for 9 miles to the point of the same name, a bluff 62 feet above the sea. At 2 miles westward of Buenos Ayres is Palermo, the palace of Rosas, now completely abandoned. The village of Belgrano stands on some high level ground $1\frac{1}{2}$ miles inland. Some little rivers empty themselves into the bay. At 6 miles N.W. by W. from Olivos point, is the mouth of the little river Conchas, where commences the large delta of Parana.

At high tides vessels of less than 8 feet draught can navigate to the Conchas, where there is an excellent port. In strong winds from the S.E. many vessels leave the roads of Buenos Ayres to seek shelter there, but it is necessary to have a good pilot, as all this western part of the La Plata is obstructed by the great flat and bank of las Palmas, on which near the coast the depths are irregular, the channel winding, and subject to frequent changes. There are in places 13 or 14 feet water, but the deepest is in front of the shore forming Olivos point, where there are from 12 to 17 feet.

Above las Conchas the shore runs to the northward, and completely changes its appearance; it is broken by a great number of little rivers, outlets from the Parana, forming sunken islets covered with wood. Of these rivers there are three more frequented than the others; the Arroyo del Capitan, the Parana de las Palmas, and the Boca del Mini. At 25 miles N.N.E. of las Conchas is the mouth of the Parana Guazu or Great Parana. The latter is the only one vessels of any size can enter, the others, although deep, are generally too narrow and winding to admit of easy navigation.

BANKS AND SOUNDINGS.

Before giving a description of the banks of the Rio de la Plata, it is necessary to bear in mind that great changes are constantly taking place in their form and positions, caused by the continued deposit of sand brought down by the Parana and the Uruguay. It is therefore necessary not to trust entirely to the charts or directions in a vessel of more than 16 feet draught, and it will always be prudent to have the aid of a pilot.

The greatest part of the sand brought down by the rivers is deposited on the Palmas and Ortiz banks; another part carried through the channel stops on the Santiago, Chico, Cuirassier, and other banks, which are continually increasing; the third portion, meeting the open sea and diffusing itself over the shallow bed of soundings, may in time shut up the mouth of the La Plata. The two principal channels along the shores of this estuary are being obstructed slower than other parts of the river; their beds are formed of layers of soft mud which indicates their course, and is the best guide for a vessel when the land is not seen; thus the bottom is more or less soft in the channel, and more or less hard on the banks.

SOUNDINGS.—Between the parallel of $34^{\circ} 30'$ and $36^{\circ} 0'$ S. the lines of soundings follow a direction nearly parallel to the coast, or N.E. and S.W., and decrease regularly at right angles towards the land. The line of 82 to 88 fathoms is from 60 to 90 miles from the coast; the line of 38 to 44 fathoms is about 14 miles nearer. The depth increases to the southward and to the eastward, and decreases to the northward and to the westward. Within the line of 38 to 44 fathoms the depths are more irregular. At 60 or 75 miles beyond the mouth of the La Plata the waters lose their blue tint and assume a yellowish green colour.

On the parallel of $34^{\circ} 0'$ S., at 75 to 90 miles from the land, there are 67 fathoms water; at 50 miles from the land there are only 22 fathoms, mud, sand, and shells; from the latter distance the depths diminish rapidly towards the land. In the lat. of the Castillos, $34^{\circ} 25'$, at the distance of 90 miles, there are from 55 to 57 fathoms water, black mud; and continuing westward on that parallel, sandy bottom, which is on the whole coast, will soon be found; within 40 miles of the land there are only 20 to 22 fathoms.*

On the parallel of Cape St. Maria there are 25 and 26 fathoms water, fine sand and shells, at 60 miles from the cape; 60 fathoms at 74 miles;

* Capt. Courier of the *Saintonge* packet, has observed during several voyages, that in the vicinity of Cape Castillos are frequently found small red or pink broken shells, which are not found elsewhere.

and 80 fathoms at 105 miles. On the parallel and to the northward the bottom is sand and shells ; to the southward the bottom is fine sand, or mud mixed with fine sand or gravel.

In the lat. of Lobos and on the meridian of $52^{\circ} 25'$ there are 93 to 99 fathoms, muddy sand ; to the north the depth decreases.

On the parallel of Cape St. Maria, and on the above meridian, there are only 58 to 63 fathoms, and in running south on the same meridian the bank bordering the coast will soon be lost. Having sounded in 93 to 99 fathoms in the lat. of Lobos, and after running 50 miles to the westward, and the depths are from 23 to 26 fathoms, muddy sand, a vessel will still be on the parallel of Lobos ; continuing the same course the depth will decrease, and the bottom will become more muddy.

On the parallel of $35^{\circ} 11'$, or that of the English bank, having passed over the shoal water of 11 fathoms, on La Plata bank, the depths will increase to 17 and 20 fathoms when nearly on the meridian of Lobos, and will then decrease ; there are 5 and 6 fathoms, sandy bottom, at less than 15 miles from the bank, nearly on the meridian of $55^{\circ} 35'$; if running on the parallel of $35^{\circ} 20'$ there will be found nearly on the same meridian 7 fathoms, sandy bottom, which, on this parallel, is the greatest depth westward of the English bank.

Between the parallel of $35^{\circ} 30'$ and that of Cape San Antonio, the bottom is sand mixed with shells and gravel. At 45 miles off Cape San Antonio there are 15 fathoms, sandy bottom. At the distance of 84 miles S.E. from the cape there are 40 fathoms ; at 15 miles North there are 6 and 7 fathoms.

LA PLATA BANK.—At the entrance to the Rio de la Plata, between the meridians of Maldonado and Cape Castillos, is a remarkable bank, with an average depth on it of from 11 to 14 fathoms, fine sand and broken shells. It extends N.E. and S.W., as if formed by the currents, parallel to the coast, at a mean distance of 42 to 46 miles, having but little breadth, and reduced in places to a few hundred yards.

It has long been known that there were detached sand-banks at the entrance to the Rio de la Plata, and several navigators had discovered them, but the different positions assigned to them had caused them to be considered doubtful. At the present day numerous observations have shown the existence of several shoals, all lying in the same straight line parallel to the coast, and proving to belong to the same bank. Its great length and narrow shape explain clearly the different position assigned to these shoals.

From the nature of this work, it can hardly be expected that we should name the various navigators who have from time to time reported the existence of different parts of this bank, which we shall now call under

the general name of La Plata. The channel between it and the coast may be from 30 to 40 miles in breadth, and 16 to 25 fathoms deep, with soft muddy bottom in the middle, mud and sand near the bank, and at 6 to 9 miles from the coast fine sand mixed with gravel and broken shells.

In standing from the coast to the south-east, the nature of the bottom will indicate the approach to the bank, the mud becoming mixed with sand, and then sand; but from seaward, only the soundings on the bank will indicate its position, as the bottom is sand, sand and gravel, or sand and broken shells, as on the bank. Having crossed it the bottom will become mud and sand, and then mud.

THE ENGLISH BANK, a dangerous rocky shoal, partly covered with sand, and dry in several places at low water, on which the sea continually breaks over a space of from 3 to 4 miles, lies nearly N.N.W. and S.S.E., 12 miles in length, and $7\frac{1}{2}$ miles in extreme breadth. From its north end Flores islet lighthouse bears N. by W. distant 11 miles, and Monte Video lighthouse N.W. by W. $\frac{1}{8}$ W. $21\frac{1}{4}$ miles. The soundings eastward of the bank are very irregular, and at the distance of from 8 to 14 miles are several shoal patches of from $4\frac{1}{2}$ to 6 fathoms water, apparently forming another bank of about 18 miles in length, north and south, with depths of 8 fathoms between it and the English bank. The bottom on this shoal ground is mud and sand, whilst that eastward of it is sand and broken shells.*

There are 6 and 7 fathoms water close to the north end of the English bank, but a vessel southward of this parallel will pass over the shoal water eastward of it, and if common precaution is taken with the lead, the approach towards the bank will be indicated. To the northward of the bank the depth will not be less than 7 fathoms until westward of its meridian. Should a vessel have occasion to anchor near it, the anchor should not remain long in the ground, as from the stiff nature of the bottom there will be great difficulty in lifting it.

A bell buoy, $4\frac{1}{2}$ feet high, has been placed on the south-east side of the bank in 20 feet water, sandy bottom, in lat. $35^{\circ} 16'$ S., but mariners should not trust to it.

LIGHT-VESSEL.—Off the north end of the English bank is a vessel painted red, having three masts, and which exhibits a *fixed* white light, visible 6 or 8 miles; but the light should not be too much depended upon, as it shows only for 6 or 8 hours, through the neglect of the watchman to supply it with oil. The vessel lies in 7 fathoms water, muddy bottom, at 4 miles N. by E. of the north point of the breakers, and about $2\frac{1}{2}$ miles from the nearest part of the shoal.

* We need scarcely remind the mariner of the many wrecks which are constantly taking place on the English bank.

THE ARCHIMEDES BANK, discovered by an English frigate of that name, is westward of the English bank, and extends over a space of about 6 miles, having on its centre $2\frac{3}{4}$ fathoms water, near its south end only $1\frac{1}{4}$ fathoms, and on other parts of the bank from $3\frac{1}{4}$ to $4\frac{1}{2}$ fathoms. The bank is composed of sand, whilst to the northward and westward the bottom is mud, or sand and mud. It should not be approached, unless in a vessel of very light draught, nearer than 5 fathoms water. Between the Archimedes and the English bank there is a channel nearly 4 miles wide, with $5\frac{1}{4}$ and $5\frac{1}{2}$ fathoms in it, sand and mud.

BANKS South of the ENGLISH BANK.—There are several sand-banks southward of the English bank, but their extent and positions are not yet well ascertained. The Meduse bank, with 3 fathoms water on it, is nearly on the meridian of Monte Video, and in the parallel of $35^{\circ} 24\frac{1}{2}'$ S. The Narcisse bank and several other patches, with $3\frac{1}{2}$ fathoms on them, lie to the south-westward and the south-east of the Meduse, between the parallels of $35^{\circ} 28'$ and $35^{\circ} 35'$. The French bank, with $1\frac{1}{2}$ fathoms on it, occupies a place on the chart in lat. $35^{\circ} 43'$, long $55^{\circ} 37'$ W. This shoal was reported by the Spanish captain Famadas in 1803, and Oyarvide was sent and searched for it for two days, at the place indicated, without success. A depth of $5\frac{1}{2}$ fathoms was found a little southward of its assigned position, and also a bank at 17 miles W. by S. of the same place.

Aizpurua reported the existence of a shoal in lat. $35^{\circ} 50'$ S., long. $55^{\circ} 20'$ W. In December 1835 the brig *Vélocé* grounded on a sand-bank with 13 feet on it in about the same lat.*

THE ROUEN BANK, with 17 feet water on it, was found by Captain Fremont of the *Ville de Rouen*. From the eddy and colour of the water it was thought that a less depth may be on it. Montravel places it in lat. $35^{\circ} 44'$, long. $55^{\circ} 58'$; and the east end of the Astrolabe bank, which extends eastward from it, in lat. $35^{\circ} 46'$, long. $55^{\circ} 45'$. Between the two positions there are $4\frac{1}{2}$ and $5\frac{1}{2}$ fathoms, hard bottom. The pilots of Buenos Ayres say the Astrolabe changes its position, but this does not agree with the nature of the bottom.

THE CUIRASSIER or Banco Nuevo, on which the French brig of the former name grounded a few years ago, has $2\frac{1}{4}$ fathoms water on it. Its north-west end is N. by E. distant 12 miles from Indio point; and its south-east point N. by E. $\frac{3}{4}$ E. $1\frac{1}{2}$ miles from the same point, and N. by W. about 6 miles from Indio point light-vessel. Between this bank and the Ortiz there is a channel a mile in breadth and about 4 miles in length, having 3 and $3\frac{1}{2}$ fathoms water, mud, and mud and sand. To the southward of the

* Probably identical with the French bank.

mud, and the decrease of soundings to the westward will indicate an approach to Flores lighthouse. With a fair wind, if a vessel is to the southward, out of the channel, the bottom will be sand, especially near the English bank, whilst in the channel the bottom is pure, soft, blue mud.

With a steady N.E. breeze, Cape Castellos should be sighted, when the vessel, aided by a favourable current, can run along the land. If, however, the wind should be from South to S.E., or the weather uncertain, by sighting the cape a vessel will be to leeward, with a strong current against her, and a heavy swell setting towards the coast. It would therefore be necessary, with South or S.E. winds, to keep a little southward of the parallel of Lobos, and steer so as to sight that islet in a West or N.W. direction. Cape St. Maria is low, difficult to be seen, and should not be steered for.

Between the parallels of $34^{\circ} 30'$ and $35^{\circ} 30'$, at 9 miles from the coast there are from 14 to 16 fathoms water; at 18 to 24 miles from the coast there are 38 fathoms; and between 81 to 84 miles from the coast 82 fathoms. Attention should be paid to the soundings over La Plata bank, and the river should not be entered before a vessel's position is well ascertained by sighting Lobos or the surrounding lands, which in fine weather will be seen at a distance of from 15 to 25 miles. As Cape San Antonio, the south point of entrance, is low, and seen only at the distance of a few miles, a vessel from the southward, in the absence of observations, must depend entirely on the lead; and in proceeding for Buenos Ayres, Indio point light will probably be the first thing seen, at a distance of 6 or 8 miles. From the vessel a pilot may be obtained.

In entering the Rio de la Plata southward of the English bank, the seaman should be certain of his latitude, and steer on the parallel of about $35^{\circ} 36'$ northward of the Rouen bank, taking into consideration the state of the wind and sea; or run on the parallel of $35^{\circ} 56'$ south of the Rouen, but carefully avoiding the parallel of $35^{\circ} 45'$. Being in 9 or 10 fathoms water, continue westward in regular soundings until in 6 fathoms, muddy bottom; then steer N. $\frac{1}{2}$ E. until Monte Video is seen, keeping in muddy bottom. Should the wind be from South round by west to N.W., neither the English nor Archimedes banks should be approached too close.

The bottom northward of the parallel of $35^{\circ} 30'$ and eastward of the meridian of Monte Video, is sand sometimes mixed with shells; whilst westward it is mud, with the exception of the tosca off Piedras point, and the Ortiz bank, which is sand.

MONTÉ VIDEO TO BUENOS AYRES.—It is customary for vessels from Monte Video to Buenos Ayres to employ a pilot, and unless the mariner has some knowledge of the navigation of the river, it is almost

where it is hard mud and tosca ; from Magdalena to Buenos Ayres it is sand, or sand and mud.

SANTIAGO BANK.—To the northward of Santiago point is the bank of the same name, having $1\frac{1}{2}$ fathoms water on it, with its outer edge about 6 miles from the shore. It is steep-to, and should not be approached nearer than $3\frac{1}{2}$ fathoms. The channel into Barragan bay is, along the coast from the eastward, or if from the westward of the shoal, between it and that extending from Lara point (*see* page 203). To the westward of Lara point is the south-east extremity of the bank stretching from the front of the town of Buenos Ayres ; the first part is called the bank of Quilmes, and the latter the Ciudad or City bank. It is composed of sand, or sand and mud. The outer road of Buenos Ayres is formed between this bank and the Palmas flats.

GENERAL DIRECTIONS.—Making the land at the entrance of the Rio de la Plata does not present any great difficulty. The inconvenience is caused by the frequency and suddenness in the changes of the weather. The latitude is of the greatest importance, and no opportunity should be lost in obtaining it either by day or night, whenever the state of the weather will admit, and, with the lead, the vessel may be navigated with safety. The best parallel for entering the river is that of Lobos islet. On this parallel, in longitude $52^{\circ} 25' W.$, in about 90 to 98 fathoms water, steer westward, so as to pass 30 miles southward of Cape St. Maria, where there are 18 to 20 fathoms water.

Before reaching the meridian of the cape, a vessel will pass over the northern part of the La Plata bank, page 209, in 11 to 14 fathoms water. Allowance must be made for the current according to the direction and force of the wind, bearing in mind that with the wind from S.E. it sets strong towards the coast. If set to the southward the depth will increase slowly, the bottom being fine sand ; if, on the contrary, the vessel is set to the northward, the soundings will decrease rapidly, and the bottom is sand and broken shells. The nature of the bottom and the change of depth will assist in indicating the course followed, and as a vessel proceeds westward the chart is the best guide ; but mud and sand will be found on the parallel of Lobos, and muddy bottom is a sure indication of being in the fairway.

Several vessels are yearly wrecked on the English bank by not paying attention to the lead and particularly to the nature of the bottom. To the westward of Lobos islet with a scant or beating wind, the north shore should be kept aboard, as it is bold ; there are no out-lying dangers at the distance of 5 miles from it, and the weather is seldom so thick for any length of time that the land cannot be seen. The nature of the bottom is

mud, and the decrease of soundings to the westward will indicate an approach to Flores lighthouse. With a fair wind, if a vessel is to the southward, out of the channel, the bottom will be sand, especially near the English bank, whilst in the channel the bottom is pure, soft, blue mud.

With a steady N.E. breeze, Cape Castellos should be sighted, when the vessel, aided by a favourable current, can run along the land. If, however, the wind should be from South to S.E., or the weather uncertain, by sighting the cape a vessel will be to leeward, with a strong current against her, and a heavy swell setting towards the coast. It would therefore be necessary, with South or S.E. winds, to keep a little southward of the parallel of Lobos, and steer so as to sight that islet in a West or N.W. direction. Cape St. Maria is low, difficult to be seen, and should not be steered for.

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In entering the Rio de la Plata southward of the English bank, the seaman should be certain of his latitude, and steer on the parallel of about $35^{\circ} 36'$ northward of the Rouen bank, taking into consideration the state of the wind and sea ; or run on the parallel of $35^{\circ} 56'$ south of the Rouen, but carefully avoiding the parallel of $35^{\circ} 45'$. Being in 9 or 10 fathoms water, continue westward in regular soundings until in 6 fathoms, muddy bottom ; then steer N. $\frac{1}{2}$ E. until Monte Video is seen, keeping in muddy bottom. Should the wind be from South round by west to N.W., neither the English nor Archimedes banks should be approached too close.

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MONTÉ VIDEO to BUENOS AYRES.—It is customary for vessels from Monte Video to Buenos Ayres to employ a pilot, and unless the mariner has some knowledge of the navigation of the river, it is almost

indispensably necessary for those of more than 16 feet draught ; for although the channel is marked by Indio point and the Chico light-vessels,* at certain places it is narrow, and the edges of the bank are liable to change after gales or extraordinary tides. The pilots alone can be acquainted with these periodical changes, but they should not be trusted too much, though their services are still at a high price, and those only known to the place should be employed.† As the banks are often steep-to, the least neglect in the steerage may cause a vessel to ground ; great attention should therefore be given to the navigation even with a pilot on board.

Vessels of less than 9 feet draught can almost always steer across the Ortiz bank in a direct line.‡ In proceeding through either channel it must be borne in mind that when in the fairway the bottom will be soft mud, and the nearer the banks are approached the more the mud will be found mixed with sand, and the bottom harder, as near all the banks sand predominates. Should a vessel's position be doubtful in consequence of thick or bad weather, she should anchor. To the eastward of the meridian of Flores a vessel should anchor only during fine weather, but westward of that meridian she may anchor without the least inconvenience anywhere when the bottom is mud. Almost everywhere near the banks in the Rio de la Plata, the upper stratum is a mixture of black mud and sand, whilst the second, which is reached by the anchors, is stiff clayey mud.

The **NORTH CHANNEL** is seldom frequented by any but coasting vessels. Leaving Monte Video for this channel, round the Panela reef to the southward, *see* page 181, and then steer about W. by N., so as to avoid the south part of St. Lucia bank, and then W.N.W. Proceed along the land, passing Santa Maria or San Gregorio and Sandy points at the distance of 4 or 5 miles, and when the soundings increase from $3\frac{1}{2}$ to $4\frac{1}{4}$ fathoms, a vessel will be off the bank extending southward between the two points. When the former point bears E.N.E., distant about 6 miles, continue along shore at the distance of about $2\frac{1}{2}$ miles, and the soundings will diminish to 16 feet southward of the Cufre, which should be passed at the distance of $1\frac{1}{2}$ or 2 miles.

* The mariner is warned that these vessels after a heavy pampero are often out of their proper positions. In September 1863, the Indio point light-vessel was $3\frac{1}{2}$ miles to the north-west, and H.M.S. *Curlew*, although steering wide of her to the south-east grounded on the Ortiz bank. The lights of vessels at anchor must not be mistaken for those of the light vessels.

† The pilotage in 1862 from Monte Video to Buenos Ayres for a vessel of about 1,200 tons, was 60*l.* ; and from the latter place to the Hornos islands and back to Buenos Ayres 19*l.* 4*s.* 8*d.*

‡ During four years the *Bisson* French surveying vessel was employed in the La Plata, she always steered across the bank, and the least depth was about 10 feet.

On arriving off Sauce point, which is more woody than the others, a course about W. by S. $\frac{1}{2}$ S. should be steered, so as to pass southward of the Pipas rocks, page 183; having passed them, close the land by the lead, and steer for Colonia roads through the channel about three-quarters of a mile wide, formed by Fishers bank, the north-west spit of the Ortiz, and the shore. The soundings, which have been regular at about 16 feet, will increase to $4\frac{1}{2}$ fathoms, and at less than half a mile southward of Colonia to 7 fathoms. In rounding the point at the distance of a quarter of a mile, 6 and 5 fathoms water will be carried into Colonia roads. If bound to Buenos Ayres, steer so as to pass $1\frac{1}{2}$ cables south of San Gabriel island, and with its centre bearing N. by W. pass about $1\frac{1}{2}$ miles south-eastward of the Farallon.

THE SOUTH CHANNEL.—In leaving Monte Video for the South channel to Buenos Ayres, steer about S.W. by W. for Indio point light-vessel; but as the currents which always prevail in this part of the river are uncertain, the course should be carefully preserved by the bearing of the Cerro as long as it is in sight, which in fine weather will be at a distance of 28 or 30 miles, and which should be carefully measured. Although this part of the bed of the river is nearly flat, great attention must be paid to the lead. At about 12 miles from Monte Video the depths will be about 4 fathoms, mud, which should be carried up to Indio point light-vessel, but if the vessel or light is not seen do not haul to the north-westward until the water shoals to less than 3 fathoms near Indio point.

Should the soundings decrease to 3 fathoms, before the necessary distance is made good, a vessel will be on the edge of the Ortiz bank, but should they increase to $4\frac{1}{2}$ fathoms or more, she will be some distance to the south-eastward, bearing in mind that the bottom is more or less soft in the channels and more or less hard near the banks. If calm or thick weather it will be prudent to anchor. Commander Boys of H.M.S. *Express*, 1854, says, "a sure method is to keep well eastward of the Ortiz bank, and make the land with caution south-eastward of the light-vessel; then run along the coast, keeping it dipping until the light-vessel is seen." But the mariner must not be deceived in his distance from the land, as it may be seen at about 12 miles off and in a few hours not 5 miles. See pp. 201, 228. The Cerro and land about Indio point are sometimes visible at the same time.*

At the distance of $1\frac{1}{2}$ or 2 miles North of the light-vessel, steer N.W. $\frac{1}{2}$ W. about 28 or 30 miles, making due allowance for the current, the

* The state of the river should always be considered, and the seaman is reminded that the light-vessel occasionally shifts her position.

direction of which will probably be seen in passing the light-vessel ; the ebb sets strong to the southward, and the flood to the north-westward. With Indio point bearing S. by W. distant 10 miles is the centre of a patch of toasca extending E.S.E. and W.N.W. over a space of about 3 miles. When the Chico light-vessel is seen, steer so as to pass northward of her, then about a W. $\frac{3}{4}$ N. course made good will lead to the guard ship and over the flats to the outer road of Buenos Ayres. Should the Chico light-vessel not be seen, in consequence of thick weather, or being out of her proper position, skirt the edge of the Ortiz bank by the lead.

Between the Ortiz and Chico banks is the deepest part of the channel, the depths increasing near the former bank. It is scarcely known of a vessel grounding on this edge of the Ortiz bank, but several have grounded on that of the Chico. From the Chico light-vessel the soundings westward are regular as far as Santiago bank, when they gradually decrease to Buenos Ayres.

If from circumstances a vessel should take the passage southward of the Chico bank, from Indio point light-vessel skirt by the lead the edge of the bank bordering the coast by keeping the light-vessel southward of an E.S.E. bearing, and always in muddy bottom. When Magdalena church bears about S.S.W., a vessel will have arrived at the entrance to the passage, which is encumbered with two banks having 16 and 18 feet water over them. Continue along the coast in not less than $3\frac{1}{2}$ fathoms, and when the ombu on Atalaya point bears S.W. by S. a vessel will be westward of the Chico light-vessel.

From Indio point light-vessel to Buenos Ayres, the navigation for a sailing vessel presents some difficulties, unless with a fair wind, and at all times requires great attention. Between the two points, in ascending or descending the river, the seaman should not attempt to beat against the current unless the vessel can attain a speed of 6 knots, if the current is beyond its normal state of one or $1\frac{1}{2}$ miles an hour ; it will be more prudent to remain at anchor. In working to windward keep the Indio point light-vessel as near as possible on a S.E. bearing as long as she is in sight, and then do not stand nearer than $3\frac{1}{2}$ fathoms on either side.

When in the vicinity of the Chico bank the ombus of Magdalena, page 202, will be seen ; they should not be brought to bear southward of S.W. by S. until on the north side of the channel. The Ortiz bank should now be kept aboard. When the ombus bear S.S.W. a vessel will be between the Ortiz and Chico banks ; they can be seen from aloft in the middle of the channel in clear weather, but will be lost sight of in 3 fathoms near the Ortiz bank. Between the Ortiz and Chico banks the soundings are irregular, and particularly near the latter, and both banks are steep-to.

The Chico bank, page 212, is one of the most dangerous in the La Plata; a vessel should approach it with the greatest caution, not too close, and the lead should be hove quickly. To the westward of the Chico, a vessel will have no difficulty in tacking on either side of the channel at a prudent distance from the edge of the banks, bearing in mind that Santiago bank is steep-to. If bound to Colonia or the Hornos islands, steer by the lead along the edge of the Ortiz bank until the islets at the entrance to Colonia are seen; then steer eastward or westward of the Farallon according to circumstances.

Vessels leaving Buenos Ayres for the south-eastward, should steer in mid-channel for the light-vessel on the north end of the Chico bank, preserving the course by the bearing of the guard-ship as long as she is in sight; and the bearing of Barragan trees will indicate an approach to the bank. Should the Chico light-vessel not be seen, on account of fog or other cause, the edge of the Ortiz bank should be skirted by the lead, and when sure of being eastward of the Chico bank, steer for Indio point light-vessel, making due allowance for the tide, and keeping the lead going.

CURRENTS and TIDES.—The general movements of the waters in the La Plata are greatly influenced by the direction and force of the wind. With fine weather and light breezes there is some degree of regularity in the tides. The mouth of the estuary being wide and shallow, the water flows easily in when the wind is from seaward, and is forced rapidly out when the wind is off the land. The variations of the winds have such an influence on the movements of the waters, that there is nearly always a possibility of foreseeing the alterations in the weather, from a daily observation of the current and height of the water.

Before the winds from the south-east and seaward are felt on the coast, the level of the river begins to rise at the shore of Buenos Ayres. For several hours, and sometimes for a whole day before a pampero, the water is seen rising in the port of Monte Video. The strength of the alternate streams produced by the tides does not much exceed one to $1\frac{1}{2}$ miles an hour; but the current caused by the wind reaches 3 and 4 miles an hour. When the current runs to the westward along the north coast of the La Plata, a N.E. wind may be expected.

Before stormy weather, or gales from S.W. or S.E., the current sets into the river and the water rises to a height in proportion to the duration of the bad weather. At times the difference between high and low river is as much as 20 feet. The winds between N.N.E. and W.N.W. cause the river to fall the lowest; the down current is then stronger along the south coast, but it seldom exceeds 3 miles an hour; on the north bank it is inconsiderable. The pamperos cause a rapid flow of water in the port of Monte Video, but it does not last more than three or four hours from

the beginning of the gale, and is followed quickly afterwards by a strong ebb, which causes the vessels to swing broadside to the wind and sea, and especially along the wharves of the town.

When the wind is from N.E. for some time, the waters flow to the westward along the north coast, whilst they are falling and running to the eastward along the south coast; and during the time the wind remains between S.E. and N.E., the current flows generally to the westward, beyond Monte Video, without much increasing the depth to that point, while it fills up the river above the banks. With the winds from N.N.E. to W.N.W., the water falls and runs rapidly along the south shore beyond Indio point, while it is imperceptible to the northward.

When gales from the North, or winds from N.W. to East prevail, the river falls a great deal, and the current runs to the S.E. and South; and when pamperos prevail, the river rises and the current flows to the N.W., West, or S.W., according to the direction of the channels. Without wind, apparent cause, and fine weather, the river may fall or rise considerably. This is accounted for through some extraordinary tide on the coast, or inundations of the affluents of the La Plata.

In Monte Video bay, the water is sometimes considerably higher at the town than on the opposite side of the bay. When H.M.S. *Gorgon* was ashore in 1844, she was detained on the beach much longer, and the labour of getting her off was much increased, by the prevalence of northerly winds from May till October, and by the very little rain that fell in the countries bordering the La Plata.

The following particulars about the general movements of the waters in the La Plata are by Dupérier:—"The Rio de la Plata increases or decreases for two causes; the first is the more or less violence of the local winds; the second is not known, but thought to be the consequence of winds prevailing on the coast, north or south of its entrance. The East winds, and those near that direction, cause the waters to rise through the whole extent of the river. With north winds the water falls on the north side, and rises on the south side.

"The winds from West to N.W. cause a fall of water everywhere above the bank of Ortiz. Below that part of the bank near Colonia, the water falls on the right bank, and rises on the left. This fall and rise is in proportion to the strength of the wind, but the fresh water from the rivers is so light, that it requires but little wind to force it from one side to the other. The rising and falling of the river without any apparent local cause, takes place in a general and uniform manner through the extent of the river."

The movement of the waters at Buenos Ayres are more regular than at other parts of the La Plata. The flood here runs 5 h. 20 m., and the ebb

7 h. 5 m. From the 20th to the 27th of August 1839, the level of the water rose from about 20 to 30 feet, with the wind from the eastward; between the 29th and 31st of July 1838, it fell from about 27 feet to 10 feet; the two dates giving a mean difference of about 20 feet. It took six days with strong S.E. winds to raise the water from 20 feet to 30 feet, and four days with strong westerly winds to cause it to fall from 27 feet to 10 feet.

Monthly observations have shown the smallest difference in level to be about 6 feet, the greatest 18 feet, and the mean difference about 10 feet. Several extraordinary falls of the river have taken place, in consequence of heavy gales from N.W. to S.W. In 1792, a gale from the S.W. for three days left the upper part of the La Plata quite dry. Nearly the same thing occurred during the war of independence; the Spanish vessels blockading Buenos Ayres grounded in the bay, and were attacked by artillery whilst left quite dry.

At Cape St. Maria on the north coast the tides are pretty regular, and the difference of level is about 5 feet. At the anchorage of Maldonado the greatest rise in ordinary weather is about 5 or 6 feet, the flood sets to the S.E., and the ebb to the N.W. With long northerly winds the height of the water is less on all this part of the coast, whilst with southerly winds it is higher by nearly 2 feet, and often more, as may be seen by the marks on the rocks. The currents are irregular; they generally follow the direction of the wind, and sometimes they indicate from what quarter the wind may be expected.

If the water rises for a longer time than the duration of a tide, in a calm or light breeze from N.W. to S.W., it may be inferred that the wind will blow from N.E. to S.E., and that it already blows from that quarter at sea. The mean rate of the current is from one to 2 miles an hour, and it is seldom more than 3 miles. It has, however, been found running to the eastward at the rate of 5 miles an hour, at 5 miles W.S.W. of Lobos isle. A vessel has been set in one night from Lobos isle to the northward of the Castillos; and a vessel in sight of Piedras point found the current setting S.E. 4 miles an hour.

It is likely these strong currents do not extend beyond the limits of the soundings, where they must lose their strength. The current is not the same at all depths; vessels of different draught in the same track have had the advantage according to the strength and relative direction of the lower or higher stream. It is not so strong nor so regular to the southward as to the northward of the English bank.

During the months of March, April, and May, the Rio de la Plata is higher than in the other months of the year, on account of the rising of its tributary rivers, which carry away whole trees, brambles, and weeds,

and which form into small masses like islets, sometimes rather large, and known by the natives under the name of Camalotes.

At the mouth of La Plata the current is nearly the same as all along the river. It has often been found to run at the rate of 45 miles in 24 hours ; which is the reason why the coast near Cape Santa Maria is so dangerous, where the sea is rough and soon rises with the S.E. winds. The coast here should not be approached when the weather is uncertain and a probability of the wind rising from that quarter.

GROUND LOG.—From what has been said of the irregularity of the currents in the La Plata, and the importance of knowing a vessel's position, it will be easily seen how useful the ground log may be made, which alone in the absence of land, &c., can indicate the strength and direction of the current ; but notwithstanding its simplicity we fear it is seldom in use. We cannot call too strongly the attention of the mariner to this subject when the depth of water will admit of its use. The very smallest line that will haul in a lead of 5 or 6 pounds weight is the best. The lead should be rounded, long, and tapered at each end, in order that it should sink fast and be hauled in easily.

The lead may be also made fast to the logship, without the peg being fixed in it, and thrown overboard ; the lead taking it to the bottom will prevent it coming easily home to the ship. In this manner it is clear that the log-line will show the distance run by the ship, both from the effect of the wind and current. Having noted the number of knots, make the line fast, so that it may be upon a strain. Set the bearing of it by compass, and the opposite point will be the ship's course. There can be no doubt of the course and distance obtained in this manner being as correct as if there were no current. If the log be hove in the usual way, and the distance shown by it, and the ship's course by compass, be compared with the course and distance shown by the first mode, sufficient data will be obtained to find the force and velocity of the currents.

CURRENT from the PARANA and URUGUAY.—The current of the Uruguay united to that from the Parana acquires great strength ; it runs between Martin Garcia island and the coast with such rapidity that the channel eastward of the island has received the name of del Inferno. At the Hornos islands it is divided into two branches ; the one following the direction of the north coast is increased by the waters of the Rosario, Santa Lucia, and other rivers, especially after gales from the south-eastward, which prevent the discharge of the rain waters, and in coming in contact with Flores islet causes a strong eddy. The other branch runs into the south channel, and as it does not receive any increase nor its course much disturbed, it is not so strong as the first.

WINDS.—One of the distinctive features of the climate of La Plata is the frequency and rapidity in the changes of the weather ; but these changes depend on certain laws which facilitate the means of foreseeing them. The general law regulating these changes here, as well as in the other parts of the southern hemisphere, is that the rotation of the winds takes place from right to left, or contrary to the movement of the hands of a watch. Therefore the wind veers from North to N.W., to S.W., to S.E., &c., &c., whilst in the northern hemisphere its rotation is from left to right, or the same way as the hands of a watch.

The prevailing winds differ according to seasons. During the summer months, from September to March, the winds prevail from the eastward. The atmosphere is then pretty clear, but thick near the horizon, and the land is difficult to be seen. In the offing the winds blow from the N.E., hauling gradually to the East in approaching the river. Within the river during this season the winds generally veer round the compass in twenty-four hours. A fine steady breeze blows from S.E. during the afternoon, in the evening it is from N.E., and during the night from North.

On the following morning it veers to N.W. and West, or else calms prevail until the wind springs up from the southward or sets in from seaward about 11 o'clock. This wind is called *virazon*. When it fails, or the wind from North or N.W. continues to blow, squalls more or less heavy may be expected from the S.W. A few days of tolerably fine weather are often followed by clouds, rain, and strong breezes, but it is difficult to foretel from which quarter they may come.

Should it be from the northward, a continuance of bad weather may be depended upon ; as, unless the wind is from the southward, there is no duration in the fine weather, although it may appear likely to last. The more clouds, rain, and wind from the northward, the more it will blow hard from the southward.

During the hot summer months, when it does not rain sufficiently to cool the atmosphere, the winds from the northward are nearly suffocating, and produce a dry, oppressive, debilitating atmosphere, which affects both man and beast in a way that would scarcely be credited by those who have not felt them. The inhabitants of La Plata consider these winds injurious, and they suffer from them even more than foreigners ; but strangers appear to feel their effects less than those who have been some time in the country. These winds are always accompanied by a depression of the barometer, which falls in proportion to its strength ; and they last about three days ; whilst blowing, the atmosphere is loaded with electricity, a storm invariably follows, during which the wind veers to the S.W.

When it blows from the southward the weather is cool and agreeable ;

there is, however, a marked difference between S.E. and S.W. winds; the former, although cool, are damp, as are all winds from the eastward; but the S.W. winds bring the most clear, elastic, refreshing atmosphere that can be imagined, and the climate of the Rio de la Plata, whilst the wind is from this quarter, can hardly be surpassed. A little time before the new and full moon, there are often strong breezes from the S.E., with rain; but sometimes it blows from the northward, not so hard as from the S.E., and the temperature is higher.

The pilots say that the wind blows from the S.E. when the moon's declination is south; and from the North when the declination is north. On those occasions the wind from the northward veers nearly always, if dry, to the N.E. Should it bring rain or much dew, it hauls to the N.W. It becomes often very strong, blows in squalls from that direction, and veering to the S.W., ends in a strong breeze. With this wind the sea rises rapidly, and falls when it ceases. The pamperos or S.W. winds seldom prevail at this season.

During both summer and winter the winds from N.W. bring hot, rainy, disagreeable weather; those from the South, when the first squalls are over, bring rain and cold weather; and those from the West, dry, hot, pleasant weather. In the roads of Buenos Ayres, during summer, when strong S.E. winds prevail during the greater part of the day, the sea is so rough that communication with the shore is impeded. At Monte Video during the same season, from November to April, the winds from East and S.E. blowing in the afternoon are called *brisas*; they cease in the evening, and are followed by those from N.E. and N.N.W., often fresh gales, prevailing during the remainder of the night, and till 9 or 10 o'clock in the forenoon.

During winter, from March to September, the most prevailing winds at the entrance of the La Plata are from West to S.W.; and in the river they are oftener from North than South or West. At that season, when the weather is really fine, the wind veers round the compass as in the summer; but in ordinary weather it happens only once a fortnight, taking place, as already mentioned, from South to East, North, and West. The winds from North blow with rain, lightning, and thunder; it hails at the first with South winds. With the wind from the East there is an abundance of rain.

When the wind veers as above, fine steady weather may be expected; but if in a contrary way it is nearly a certain sign of bad weather. During winter the winds from South have the character of lasting squalls, whilst in the summer they are of a shorter duration, but more sudden and violent. In Buenos Ayres roads the winter is preferable to the summer,

as the winds blowing generally from the S.W. or N.W., the sea is smooth and communication easy.

During the months of June to October the squalls from S.W. or pamperos prevail the most; at that time the winds are variable, with squalls, calms, and rain. When the wind is from the East, with squalls, it is generally followed by those from the West, with squalls, and *vice versâ*, and the weather sets in fine again only when the wind veers either to the North or South according to its rotation. Thus the wind begins at West, veers to the South and S.E., blows rather strong at East and N.E., changes to N.W. in a squall, and the weather becomes fine again only if the wind settles in the North.

PAMPEROS.—The bad weather in the La Plata sets in with the wind from S.W. or S.E. The winds from the S.W., whether strong or light, are called *pamperos*, from their blowing over the pampas before reaching the coast. They may be divided into two classes; the general and the local pampero. The local pampero is of short duration, and should it blow hard the weather is clear. The general pampero, on the contrary, is accompanied with rain and storms. It descends from the Cordilleras, passes over the pampas, generally lasts for three days, and is known in the La Plata by the name of *pampero sucio*, or dirty pampero.

They set in generally with a strong squall from the westward, which darkens the horizon, and is followed by other heavy squalls of wind, rain, hail, and thunder; soon after the sky becomes clear, the wind remains, becomes cool, and veers to the S.W. and S.S.W. By attention to the barometer and the state of the atmosphere, the coming of a pampero can be foretold nearly to a certainty. A vessel from the northward on reaching the parallel of 30° or 32° S. will be in the vicinity of the pamperos. These squalls are dangerous, as they are sudden, but their violence has been exaggerated, and they are no more to be dreaded than the heavy squalls which are met with in other parts of the world.* Let not the sailor however, by these remarks, be thrown off his guard.

The different circumstances which generally precede a pampero are:— Interruption of the regular daily and nightly breezes. A series of north winds, with great heat, and suffocating atmosphere. Fresh breezes from N.E., followed by unsettled weather, then by a North wind, freshening and veering to N.W., with haze or a little rain; if in this case it should be hazy with lightning in the S.W. a pampero is certain. A great depression of

* The pamperos have now and then assumed the violence of heavy gales, but the occurrence is more and more rare; all frequenters of the La Plata agree that the violence of the pamperos has been continually on the decrease since the present century.

the barometer, for several hours and sometimes entire days. The rising of the water of the river. The presence of myriads of insects in the air, and a kind of white filament (virgin's thread).^{*} And lastly, the extreme clearness of the atmosphere, which admits the cerros of San Juan to be seen from Buenos Ayres, and other objects at a great distance.

As soon as the pampero blows, the temperature becomes cold; its duration in winter is generally from two to three days, it may last five or or six, but very seldom. In summer it is less frequent than in winter; it does not last so long, but blows with more violence. It is known then by the name of *turbonada*, as after a few hours it veers to South and S.E., losing all its force. In the winter it often veers to South and S.E. when it blows in squalls for several days; it being then foggy with rain, and consequently the coast not easily seen. When it comes on with a clear sky it lasts longer than in cloudy weather. Should it continue raining whilst the wind veers to South and S.E., it is a sign the pampero will last, and that fine weather will be preceded by squalls from the S.W.

If on the rising or setting of the sun it should lull occasionally, it is a sign of an early change or less wind, and if it freshens again it will only be for a short time. When the pampero is about to abate, the atmosphere becomes clear, and the wind veers back to West. The weather is generally bad at the end of August, and in 1860 about twenty vessels at Monte Video and Buenos Ayres were lost. There is the same regularity here in the change of weather as there is about the time of the equinoctial gales in the English Channel.

S.E. WINDS.—These winds blow with much force, cause a heavy sea, and a strong current to the north-east; they are known in the country by the name of *suestadas*, and are the more dangerous as they prevail on a coast without shelter, accompanied with rain and fog, which prevents the land from being seen. They are anticipated by a great rise in the barometer, cloudy threatening weather with lightning, and a red sky on the rising of the sun; the water in the La Plata and the coast becomes high, and a strong current flows into the river, especially beyond Ortiz bank.

If in the river with these winds, and unable to reach a port, it will be prudent to anchor on muddy bottom, under the lee of any sand-bank. If eastward of Lobos isle, the vessel will be set rapidly towards the Castillos, where shelter will be found on the north side of the cape, as mentioned at page 165, or she may stand off shore until the return of fine weather.

^{*} Lieut. James P. Thurburn, Com. H.M. brigantine *Griffin*, 1850, says, I have several times observed this singular phenomenon in the Rio de la Plata. It generally takes place in very fine weather, perfectly clear atmosphere, and light northerly winds. The whole of our clothes, hair, and the vessel's rigging were covered with long white slender webs, not unlike that of a spider's.

It is in consequence of these winds from the S.E. that so many casualties and wrecks take place at the entrance to the La Plata.

BAROMETER.—The rise and fall of the barometer will always indicate the changes of the weather, though it may frequently happen that the oscillations may be the same with opposite winds ; it must therefore be consulted with great regularity. The general rule is, that it rises with easterly winds, and falls with westerly winds ; but with bad squally weather it invariably falls, from whatever point the wind may be blowing. The greatest mean height of the barometer takes place in August and September ; the lowest in the months of January, February, and June. The highest range may be about 30·6 inches, and the lowest 29·3 inches.

In fine weather the mercury falls a little for East and S.E. winds, and rises again when they are settled, falling again for westerly winds. If with westerly winds the barometer continues to fall, it may be inferred that it will blow again from the East. The barometer will fall with the wind from any quarter for stormy and unsettled weather ; but with the wind from S.E. to N.E., immediately after the storm, or as soon as the weather is clearing up, it is not long without rising and remaining sometimes very high as long as strong winds from S.E. prevail ; if on the contrary the barometer continues falling, and especially if it should become cloudy in the S.W., a pampero may be expected.

The fall which precedes bad weather is generally a great deal slower than the rising which takes place when the weather is clearing up. The barometer has a diurnal oscillation which is very perceptible : it reaches its maximum at sunrise, begins to fall about 9 h. a.m., reaches its minimum from 12 h. to 4 h., and then rises again at sunset. In general, the height of the barometer is in inverse ratio of the temperature ; it reaches its mean greatest height with the winds from S.E. and South, and its minima with the wind from the North. The mean of these maxima heights is 30·5 inches, and of the minima 29·5 inches.

Captain Heywood says, " The barometer, if properly consulted, gives ample and unfailing notice ; the average height of the mercury is 30 inches, though rather less in the vicinity of the Rio de la Plata, during settled weather. Before and during southerly and easterly winds, it rises as high as 30·50 ; and before and during northerly and westerly winds, it sometimes falls as low as 29·50. A great fall is almost always succeeded by strong southerly winds ; but before they commence the mercury ceases to fall, or even begins to rise. Before a very heavy pampero, the mercury falls to 29·40, 29·30, or even to 29·20 ; but 29·40 is low for the Rio de la Plata, supposing that 30 inches is the average height during the year. S.E. gales are foretold by a high barometer, with cloudy threatening weather and lightning, a red sky at sunrise, and

a high river and a strong current running up, particularly above Ortiz bank."

THERMOMETER.—The mean temperature in the La Plata is about 65°, but the changes of the temperature are as sudden as the changes of the wind;* an inconvenience common to all flat countries where no mountain or forest exists to serve as a screen or to alter the direction or the force of the wind. It frequently happens that in the course of the same day the influence of the four seasons are felt according to the point from which the wind is blowing. The climate however is very healthy; great cold or great heat is unknown.

The extreme thermometrical limits are from 32° to 88°. The highest temperature is in the first fortnight of February; the lowest in the first fortnight of July. The thermometer rises with north winds and falls with south winds. It seldom snows, but in fine winter nights the ground becomes covered with hoar frost, and the stagnant water with a slight coating of ice melting with the first rays of the rising sun. The mean temperature of Buenos Ayres is higher than that of Monte Video by one or two degrees.

FOG or HAZE.—During the winter months of July, August, and September, there are thick fogs, especially from the entrance of the river to Ortiz bank; they are not so intense farther up. At Buenos Ayres they seldom last more than a few hours.

RAIN.—The rain is very irregular in the La Plata; it falls more frequently during the spring and autumn than in the other two seasons. May and October are the two months when it rains the most; it is more frequent during the night than by day, which is not the case in Europe. The distribution of the rain is unequal, and several provinces of La Plata suffer a great deal in consequence, causing great loss to the agriculturist and to those breeding cattle. The want of rain sometimes turns to a public calamity, and ends by torrents. The following annual result of the weather at Buenos Ayres is the mean of fifteen years: days with rain, 74; days with storm, 36; days clear, 135; and days indifferent, 120.

As the difference of temperature between day and night is always considerable, the vapour dissolved in the atmosphere begins to condense as soon as the sun has set, when the dew falls by its own weight; and it often happens in clear weather that it looks like thin rain.

LIGHTNING is extremely frequent during the summer, and indeed all the year round it is more frequent in the La Plata than in most other parts

* I have known the thermometer to rise between 9 a.m. and 3 p.m. from 66° to 88°—Capt. Sir Thomas S. Pasley, 1844.

of the world. Vessels' masts, churches, and houses are often injured. These accidents, however, do not so often take place as might be imagined from the frequency and vividness of the lightning.

MIRAGE or REFRACTION.—In the Rio de la Plata there is a great deal of refraction, and more so in the tributary rivers. It often happens that objects above the visible horizon disappear; others under the horizon rise and are clearly seen at great distances. At Buenos Ayres the cerros de San Juan, under the horizon, on the Oriental coast, a distance of 36 miles, are sometimes seen. When this is the case the atmosphere is extremely clear, and it is a most certain sign of bad weather.*

This extraordinary refraction not only takes place near the horizon but also many degrees above it. E. Mouchez, capitaine de frégate, gives an instance of a fog rising during the time he was taking observations, which hid the sun but slightly, leaving the limbs clearly visible. In calculating the hour angles and comparing the different series, it was found that the refraction had regularly increased with the fog, and that at the last observation, when the altitude was 31° , it was higher by $1' 25''$ than that given by the tables.

OFF-LYING ISLANDS.

TRINIDAD ISLAND, about 3 miles in length, in a N.W. and S.E. direction, and from one to $1\frac{1}{2}$ miles in breadth, is in lat. $20^{\circ} 31' S.$, long. $29^{\circ} 19' W.$ It is a rugged mass of rocks, the centre peak rising to 2,020 feet above the sea, and what soil there is on the island is on the eastern and southern sides. The latter is indented with small bays; but the whole is so iron-bound a shore, and there is such a swell surging against it, that it is almost impossible to land anywhere without danger of staving the boat, as the shore is skirted by sharp rugged coral rocks.

On the western side of the island there is a large arch or hole, forming a natural passage made by the sea through a bluff of about 800 feet high; it is about 40 feet in breadth, nearly 50 feet in height, and 420 in length, over a depth of more than 3 fathoms; when the sea is smooth a distant rock covered with shrubs may be seen through the arch, and is extremely picturesque. There are also on the same side of the island two remarkable rocks, one called the Monument or Nine pin†, and the other the Sugar-loaf, the latter greatly resembling that at Rio de Janeiro.

The Monument is 850 feet high, of a cylindrical form, with a slight inclination, which makes it look from certain points as if about to fall. The Sugar-loaf, at the south-east end of the island, is 1,160 feet high, of

* Colonia lighthouse, and vessels at anchor there, were plainly seen by the naked eye, at a distance of 30 miles.—R. Cook, master, H.M.S. *Stromboli*, July 1862.

† This name was given to it by Dr. Halley in 1700.

a conical form. The island was formerly supplied with water from two or three sources, but the springs appear now to have almost dried. Vessels have occasionally anchored off the south-western and western sides. The island was taken possession of by Dr. Halley, afterwards Astronomer Royal, on the 17th April 1700, and in 1781 the English tried to form a settlement on it, but failed; and more recently the Brazilians, with like success.

In 1844 Captain Buckle, in H.M.S. *Growler*, visited the island. He says:—"We lay-to off the east side of the island, about a mile from a sandy beach, and I landed without much difficulty on a projecting rock at the south end of the beach. From a distance it appears easy to land, but on approaching the shore we found that below the tide mark the bottom was nearly all coral rock, nearly awash for some distance, with the surf on it, which must always render the attempt to land very injurious to boats, and often dangerous. By keeping the boat's head to the swell, and watching, we effected a safe landing; but it was not without some risk that we got off again, as the water had fallen some 3 or 4 feet in as many hours, and the sea broke occasionally.

I searched for the ruins of the settlements, but could find no traces of them; the spots where the buildings formerly stood are overrun with the castor-oil plant and coarse grass, growing on a rich mould, apparently favourable for vegetation. The island must be of volcanic origin, and is similar in some respects to the higher parts of Ascension. A small stream of water descends a ravine to a small shingle beach at the south-west end of the island, but I did not trace it thither. At the period we were there, during a perfect calm, I do not think a boat could have filled water, but casks might have been rafted off.

There was no water on the eastern side of the island, though we observed several dry water courses. On the higher parts of the island the stems of many dead trees were scattered about, none of them more than 6 inches in diameter, and from 15 to 20 feet in length. They must have been in this state for several years, were perhaps killed by continued drought and then blown down. We saw no trace of an animal of any kind, but the footprints of a large dog, a fishing racoon, or perhaps a wild cat, close to the place where we landed.

Several kinds of gulls and sea fowls were numerous, amongst them sea eagles, men-of-war birds, and boobies. The gulls were so tame that several were caught by the hand. One species had their nests in holes half way up the Sugar-loaf, which is a truly magnificent rock. Near its base was probably the spot where the settlement was established. A few pieces of broken oars and boats, and a piece of a vessel's bulwarks, were lying on the beach. The only trace of a human habitation was a small space enclosed by a pile of stones about three feet high, close to a detached rock

about eight feet high, which formed one side of it, and under which there was a slight hollow, which, with some kind of roofing, afforded shelter for one person to lie under."

In 1858 Captain Selwyn, of H.M.S. *Siren*, who visited the island says:—"No water could be obtained, and the island was uninhabited."

The **MARTIN VAS ISLETS** are three small barren islets or rocks, with a few bushes on them here and there, lying north and south over a space of about 2 miles. The central one is the largest, 300 feet high, and bears E. $\frac{1}{2}$ S. distant about 26 miles from Trinidad. The two northern islets are near each other, but the southern is about a mile apart; they are steep and inaccessible. There are 12 fathoms water at about a mile westward of the islets; the bottom is visible, and the depths decrease gradually over rocks to $1\frac{1}{2}$ fathoms close to the largest islet. Rock cod and other fish can be caught. A sunken rock is said to lie at a short mile S.W. of the south islet.* The largest islet is in lat. $20^{\circ} 28' S.$, long. $28^{\circ} 51' W.$; other authorities place it about $1' 40''$ farther west. At 90 miles north-west of these islets there is no bottom with 1,200 fathoms.

* Captain Menkman, of the merchant vessel *de Amstel*, May 1842.

CHAPTER VII.

TOURO POINT TO PARÁ.

VARIATION, 9° 0' West to 1° 30' West in 1864.

THIS chapter contains a description of the north coast of Brazil, from Touro point at the great elbow or north-east extreme to Pará.

THE COAST from Touro point runs W.N.W. for about 31 miles to Tres Irmaõs point. It is low, interspersed with small villages and groups of cocoa-nut trees, but with few other distinguishing objects, and skirted at the distance of about a mile by reefs, some parts of which at times uncover. The depth of water between the inner and outer reefs* varies from 4 to 9 fathoms. From Tres Irmaõs point the low shore, forming a bay about 4 miles deep, trends to the westward for 29 miles to Tubaraõ point, and at 16 miles farther on is the mouth of the Rio dos Conchas.

Between the entrance to the Agua Maré, at 18 miles westward of Tres Irmaõs point, and that of the Conchos, the coast is broken and cut by several rivers and small streams, causing shallow water and numerous shoals, the latter having from about 6 to 11 feet water on them, and lying generally at a distance of $3\frac{1}{2}$ to $4\frac{1}{2}$ miles from the shore; whilst the Restinga do Minhoto, a narrow ridge with $2\frac{1}{3}$ fathoms on it, 3 miles in length east and west, with the former end on the meridian of Agua Maré, lies 6 miles from the coast.†

THE CURRENT from Cape St. Roque along the north coast of Brazil, depends much on the season of the year, and the direction and force of the wind. The equatorial current is divided into two branches eastward of the cape, page 11, one of which sets to the southward, whilst the other runs to the westward along the north coast. The S.E. trade being the prevailing wind throughout the year, and in full force between March and September, not only checks the southerly set, but forces the water on the east coast to the northward, round the cape, causing a general set along the land to the westward.

But between September and March, the wind drawing to the eastward and so far northward as E.N.E., blows almost at right angles across the stream, and thus considerably diminishes its strength. The general ten-

* For the description of the outer reefs, see pp. 26-28.

† See Chart :—Touro Point to the Rio Mossoro, No. 888, scale, $m=0.4$ of an inch.

dency of this current is to the north-west nearly in the line of the coast, and during the former months, when the wind is in the S.E. quarter and stronger than in the latter months, it often runs with much rapidity, but at other times not more than from about half to three-quarters of a mile an hour.* See page 11.

SANTO ALBERTO CHANNEL.—At one mile westward of Tres Irmaõs point is that of Santo Alberto, known by a group of cocoa-nut trees, and being the easternmost in this immediate vicinity. Between the latter point and the inner of the numerous reefs inside the hook or west end of the Lavadeiras, is the channel of Santo Alberto, about half a mile wide, and carrying 17 feet water; a steam vessel passing inside the Lavadeiras and other reefs, whose draught will admit, will have no difficulty in using this channel by keeping a short half mile from the shore. Having passed through it the water will again deepen, when she may proceed to the westward or anchor off the town of Caiçara, at $2\frac{3}{4}$ miles westward of Tres Irmaõs point, according to circumstances.

AGUA MARE RIVER.—The mouth of this river, where three or four small streams run into the sea, is choked with sand-banks, leaving passages into it 3 feet deep, when it trends to the eastward parallel to the coast for 8 miles. The village of the same name stands at the confluence of the streams at the western side of the entrance.

The RIO AMARGOSO or ASSU, the principal of the several rivers on the north coast of Rio Grande do Norte, disembogues at 12 miles westward of Tubaraõ point. Its mouth is encumbered by sand-banks, which leave a channel about 5 feet deep into the river, when the depth increases to $4\frac{3}{4}$ fathoms, and at 7 miles up there is one fathom of water. The town of Macáu stands on the right bank at about $3\frac{1}{2}$ miles from its mouth, and at half a mile above it is the entrance to the Salinas. Many parts of Brazil are supplied with salt from this neighbourhood.

Eastward of the Amargoso are the mouths of the Alagados, Arrombados, and Tubaraõ; whilst westward is that of Cavallos, and Conchas, the latter being the second in size, having a channel into it 4 feet deep, and about the same depth at 5 miles up.

The COAST, from Conchas point at the west side of entrance to the river of the same name, runs to the north-west for about 12 miles to Mel point, which is composed of red cliffs, with low white spots of sand on each side of them; and where there is a small village and some cocoa-nut trees;

* Col. Sabine found the current in July, north-west of Cape St. Roque, running at the rate of 62 miles a day; Lieut. T. B. Collinson, in April, found it running for twelve days, at 37 miles a day, and on one occasion 57 miles a day; and Lieut. Hewitt, in the same month in another year, found it setting 47 miles a day. See also p. 24.

and $5\frac{1}{2}$ miles farther on is Redonda point, with a village and cocoa-nut trees, from thence it trends westward for 11 miles to the entrance of the rio Mossoró, which separates Rio Grande do Norte from the province of Ceara.

About midway between Conchas and Mel points is the village of Rosado, and some cocoa-nut trees, fronted by a reef of rocks about a mile in extent, the latter forming an angle with the shore. Here the land becomes higher and level, and continues so for about 4 miles westward of Mel point. This part of the coast is fronted by shoals, having from one to $1\frac{1}{2}$ fathoms water over them, which extend $3\frac{1}{2}$ miles off, but there is a passage between them and Mel point, about three-quarters of a mile from the shore, carrying $2\frac{3}{4}$ fathoms water.

The morro Tibaõ, north-west of the rio Mossoró, is a hill of red sand, terminating at the sea and very remarkable. The Reteiro Pequeno, a little farther on, is a red sandy point, and the Reteiro Grande, at about 21 miles more to the north-west, is rugged, with a pinnacle close to its base, which when bearing W. by S. will appear open. The land south-east of this latter point for 3 or 4 miles is said to have a singular appearance like two steps, the lower being reddish and the upper gray. At about a mile from the point there are several rocks, the outer of which is covered at high water.

The coast from point Reteiro Pequeno is bordered by the recife, which occasionally breaks and continues along shore for about 60 miles north-west of Ceara. At about 10 miles north-eastward of the point there are only about 5 fathoms water; but from thence to the north-westward the soundings are mostly regular, and decrease gradually towards the shore from a distance of 12 or 15 miles.

JOAO da CUNHA is a group of dangerous rocks about $1\frac{1}{2}$ miles in extent, which only occasionally uncover, with 14 to 17 fathoms water close to them, and from a half to $4\frac{1}{2}$ fathoms between them. They lie with their north edge in lat. $4^{\circ} 44'$ S., on the meridian, and at the distance of $10\frac{1}{2}$ miles from Redonda point. There are 19 fathoms at $2\frac{1}{2}$ miles north of the reef, and inside it the water gradually shoals from 12 to $3\frac{1}{2}$ fathoms at a mile from the shore. These rocks were seen in December 1830 by a merchant vessel, named the *Angerstein*; they are of a dark brown colour, and by day when covered show sufficiently for a vessel to steer clear of them.

RIO MOSSORO.—The mouth of this river is encumbered by sand-banks, leaving a narrow passage into it carrying only 4 feet water, when the depth increases to $3\frac{1}{2}$ and $4\frac{1}{2}$ fathoms, the latter being about 2 miles up. There is a small village at the west side of entrance.

RETEIRO BAY.—There is anchorage in this bay, westward of point Reteiro Grande, in 3 fathoms water, or farther in if the vessel's draught

will admit of it, where there is smoother water, as the rocks off the point break much of the sea. Here vessels bound to Aracati generally anchor when wishing to communicate with that place. There is a house in the bottom of the bay for the accommodation of travellers, and farther up the valley are others, where a horse and guide may be procured. The distance from this place to Aracati is about 18 miles, and a great part of the way is along the sea-shore. To enter this bay give point Reteiro Grande a wide berth, and steer in with a hill in the south-west part of the bay bearing S.W., and when the point bears E.S.E. anchor.

THE RIVER JAGUARYBE.—The entrance to this river, navigable for vessels of about 10 feet draught, lies about N.W., distance 21 miles, from point Reteiro Grande. It is narrow and dangerous, having shifting banks of quicksand on either side, on which the sea breaks with much violence. The river, when swollen with rains, forces its way through the banks in various directions, forming new channels, so that there is no certainty of their being long in one position. In the dry season vessels may be detained here for months for want of sufficient water.*

The river widens immediately within the bar, forming a basin about half a mile in extent, having from one to $2\frac{1}{2}$ fathoms water. At about half a mile southward of the east point of entrance on the same shore, is the O'Neil bank, which dries at 2 hours ebb, and at 3 cables south-west of it is Cocoa-nut island, with another small island on the eastern shore southward of it. The river trends to the southward, carrying from one to 8 fathoms water for $7\frac{1}{2}$ miles from its entrance to Smack point, where it curves to the eastward and round to the south-west for about a mile to the town of Aracati on the right bank.

The town of Aracati has a trade to some extent, chiefly in hides procured from the surrounding country. It consists of one long street extending east and west, with several minor streets branching from it to the southward. The houses, unlike those of any of the villages in the vicinity, are of two stories, because the floods are sometimes so great as to render it necessary to retreat to the upper part of them. It has three churches, a town-hall, and a prison. The stream abreast it is fordable at low water, and some parts of the bed of the river are dry.

TIDES.—It is high water at the river Jaguarybe, full and change, at 6 h.; spring rise 8 feet, and neaps 6 feet.

DIRECTIONS.—The land in the vicinity of the bar of Jaguarybe is very barren; on the north side of entrance is a high red bluff, and two rocks close to the water's edge; one of these has the appearance of

* See Plan of Aracati or Jaguarybe River, No. 536, scale, $m = 2.0$ inches; and Plan on Chart of South America, East Coast, Sheet 4, No. 538, scale, $m = 1.0$ inch.

a large gun mounted, with a small fort and flagstaff, and some huts close to it. A ridge of heavy breakers, without any appearance of an opening, extend across the mouth of the river, which, with the above objects, the smoothness of the water within and the low sandy point on the south-east side, are good marks by which the entrance may be known.

Having closed with the bar to a prudent distance, it will be necessary to obtain a pilot, or find and mark by a buoy or a boat the deepest water into the river, which should be entered about half an hour before high water. After the outer banks are cleared, the channel trends westward between the high sandy beach on the north, and a bank usually marked by perches, and which dries at 2 hours ebb, on the south ; the passage is narrow, and called by the pilots the funnel.

Having passed this narrow channel, steer to the southward, with the shoal extending northward from Sandy point on the port hand. When a little past the point, haul close over to the eastern shore, the channel being between it and the O'Neil bank, and where the water is smooth. The bank should be approached with caution, and the lead kept going. A vessel whose draught of water does not exceed 10 feet, may proceed up at 2 hours flood to Cooks anchorage, where vessels generally load, and, by waiting for the tide, may go $2\frac{1}{2}$ miles farther up with safety, and take in cargo.

Sailing out of the river is more dangerous than going in, as the wind is only favourable for passing the bar during three hours in the morning, and then it cannot be depended upon. Should it fail or head in the least, the vessel would be in danger, as a heavy sea is always running on the bar, and the channel is so narrow that anchoring would be useless. When a vessel is through the funnel, and as far down as the outer perch, and being on the starboard tack, as much canvas should be set as she can carry. No vessel should attempt to go out, if it has been blowing hard the day before, as a heavy swell will then be on the bar, and probably the breeze not regular.

THE COAST, from the mouth of the Jaguarybe, trends to the north-westward for about 60 miles to Macoripe point, at the east side of entrance to Ceara bay. The shore is a continuous succession of low sandy hills with scarcely a sign of vegetation. Inland, southward of the Jaguarybe, is the morro Aracati, and north-west of it, which commence to break the uniformity of the great plain of sand westward of St. Roque, the several mountainous ranges named Monte Cascavela, Canaveiros, Massaranguape, and Tarataji, the latter two being parts of the Serra de Ceara.

At about 18 miles south-east of Macoripe point, on the west side of some low level land, is a bay with a village. The bay is surrounded by

high perpendicular cliffs, against which the sea breaks at half tide. Within a high round rock there is anchorage in $2\frac{1}{2}$ or 3 fathoms water, and north-west of it, but exposed to the swell, in 4 or 5 fathoms. Water may be obtained in this bay by digging.* The coast is bordered by the recife, which has many breaks in it, and there are from 7 to 10 fathoms water, at the distance of 7 or 8 miles.

Pimentel says, "at about 9 miles from the river Jaguarybe, the land, for nearly 12 miles close to the sea, appears dark and full, with several openings close to the bays. At about $1\frac{1}{2}$ miles from the commencement of these openings are some white cliffs, in shape like a schooner under sail with her head east. After passing this dark land, the coast assumes a more level appearance." At the distance of about 10 miles N. $\frac{1}{2}$ W. from Mocoripe point the water shoals to 7 fathoms.†

CEARA BAY.—Macoripe point, a sandy bluff, is tolerably elevated, and distinguished by a lighthouse. A reef of rocks extends N.N.W. from the point for the distance of nearly half a mile, some of which are uncovered, and on which the sea breaks. The shore from the point curves to the southward, and then westward for about 4 miles, to a reef extending from a sandy beach, forming Ceara bay. There are several rocky shoals in the bay, with deep water between them. At about $1\frac{1}{4}$ miles northward of the town is the Baixo da Velha (old woman), which is the outer shoal, and will be known by the breakers over it. Midway between it and the shore is the Lobvendo, and farther in is another shoal, seen at half tide, and within which is the anchorage for small vessels.‡

Eastward of the latter shoal are two other patches at less than a quarter of a mile from the shore; and lastly, at about three-quarters of a mile westward of Macoripe point, is another patch. The bay is exposed to all winds from East round by north to West, and there is a constant swell from the north-eastward. The anchorage is, however, considered safe, particularly from December to May. The wind is commonly weak and irregular; it freshens, nevertheless, in the afternoon, and deadens in the evening.

The Villa da Fortaleza, or town of Ceara, the most important upon this part of the coast, is built upon sand in the form of a square, about $2\frac{1}{2}$ miles westward of Macoripe point. The houses have a ground floor only, and the streets are not paved; but some of the houses have a foot-path of brick in front. It contains a cathedral and a church, a governor's

* In Imray's Chart of this coast for 1860, a rock marked doubtful is placed about 2 miles north of the east point of this bay, but we have no account of it.

† Lieut. A. Tabuteau, H.M.S. *Spy*, 1860.

‡ See Plan:—Ceara Bay, scale, $m = 1.0$ inch, on Chart, South America, East Coast, Sheet 4, No. 528.

residence, town hall, custom house, and treasury. It is protected by a fort, which is incomplete, standing on a sand-hill between it and the shore. The population may be about 3,000. The town has a small trade in cotton, hides, india-rubber, and a species of dried meat, called *carne de Ceara*.

Landing is difficult and uncertain, for the sea breaks with great violence on the sandy shore, and it becomes dangerous at high water. It can be effected only from half tide to half tide. The reef lying about 300 yards and parallel to the beach, appears at half ebb, and forms a breakwater until half flood, when the sea running over it causes a surf, in which it is impossible for a boat to live. It is advisable to use a grapnel, so that the boat's head may be kept to the swell.

Supplies.—Fresh beef may be obtained here, but provisions of any other kind are scarce. Water is scarce, and can only be procured in small quantities by digging wells a few feet deep. It may be obtained easier at the anchorage under Macoripe point.

LIGHT.—On the extreme of Macoripe point, is a lighthouse 37 feet high, which exhibits a *fixed* white light of the third order, visible at a distance of 10 miles. When seen at some distance from the eastward the lighthouse appears detached and like a vessel under sail.

PILOTS may be obtained by making the usual signals ; they come off in catamarans, but never farther out than about 2 miles.

TIDES.—It is high water at Ceara, full and change, at 4 h. 30 m. ; and the rise of tide is about 9 feet.

DIRECTIONS.—The Serras de Ceara, some distance inland, may be seen at a distance of 45 miles. The peak of Massaranguape, one of the most conspicuous, is nearly on the meridian of $38^{\circ} 40' W.$, and in the parallel of $3^{\circ} 58' S.$; it rises about 16 miles S.S.W. from the town, and is a good distant object to steer for. When coming from the eastward run down in the latitude of Macoripe point, to which give a berth of three-quarters of a mile ; and when the lighthouse bears about S.E., distant one mile, steer about S.W. by W. towards the fort, observing not to open the southern tower of the cathedral westward of the northern tower.

A vessel of large draught should anchor in $5\frac{1}{2}$ or 6 fathoms water, over sandy oaze, good holding ground, with the lighthouse bearing E. by S. $\frac{1}{2}$ S., distant $1\frac{1}{2}$ miles. There is also good anchorage under Macoripe point, southward of the lighthouse, in about 4 or 5 fathoms. Steam vessels generally enter the inner anchorage before mentioned by the eastern channel, which is about 2 cables in breadth, and sailing vessels by the western ; but it should never be entered without a pilot. In this anchorage there are 18 and 19 feet at low water. It is necessary to moor ; the holding ground is good, and vessels never drive.

The COAST from Ceara bay runs straight to the north-westward for about 55 miles to the meridian of the morro Melancia, an isolated down of sand, close to the beach. In the intermediate distance are the mouths of the rivers Ceara Velha, Cioppé, and Curú. The village of Curú is about 30 miles from Ceara. There is a reef, on which the sea breaks heavily, extending from the point on which the village stands.* The Morro de Curú is some 18 miles north-west of the village, and in the interior south-westward of it is the Serras do Mandahú, called also the Serras Grande.

All this part of the coast is one succession of low downs of shifting sand, barren and sterile near the sea, presenting no traces of culture or habitations, with nothing to vary it. The bottom is clean, and at 2 or 3 miles from the shore there are from 6 to 13 fathoms water, over fine gray sand; and this latter depth is found at 4 miles from the land, as far to the north-west as the village of Curú, when the water becomes shallower, but the depths gradually increase off shore.

From the morro of Melancia the coast trends a little more to the westward, and at the distance of 48 miles is Tapaji point. The village of Almufedas, standing within the sand downs on the shore, at about 14 miles south-eastward of Tapaji point, is situated on the bank of the river Aracati Miram, navigable for small vessels. From the offing the steeple of the village may be seen among a group of cocoa-nut trees, and which serves to indicate the eastern edge of the Paracel de Caracú. This latter part of the coast in aspect is the same as the preceding. The mariner is here cautioned to make an allowance for the current.

The PARACEL de CARACU.—This bank, said to be called after the largest village on the coast from which it extends, stretches along shore at the distance of about 11 miles from it, from the village of Almufedas to that of Jericoácoará about 30 miles westward of Tapaji point. From a depth of 6 fathoms, at the above distance from the coast, the soundings gradually decrease to the shore. Vessels of large draught should not sight the coast, but keep at a distance of 12 miles from it. At this distance the tops of the cocoa-nut trees are only just seen in the finest weather.

A vessel under 15 feet draught, when on the meridian of mount Caracú, may close the land, and sight the village of Castelhanos, but those above that draught should not approach this part of the coast in less than 6 or 7 fathoms water, until westward of the meridian of Jericoácoará, when a vessel may close the land to a prudent distance; there are no dangers, and 4 fathoms water will be found at half a mile from the entrance to the cove

* Capt. Wellesley says, "the catamarans on the beach, with their sails hoisted to dry, had the appearance of large boats sailing upon a river, until the regularity of their distance, and a nearer approach, dispelled the illusion."

of the above name. The rivers Tapaji and Caracú, westward of the point of the former name, are said to be navigable for small craft.

THE COAST from Tapaji point trends nearly west for about 28 miles, to Jericoácoará point, where it curves a little to the southward, forming a slender bay, and then westward for about 70 miles from the latter point to the barra Iguarassu. It is composed of low white sand, having in the interior, here and there, clumps of small brushwood; and south-eastward of the barra Iguarassu are the Serras dos Cocos, or serras d'Hybiáppabás which may be seen in clear weather, and are the last mountains or the first eastward of Maranhão.

Between are the mouths of the little rivers Cumucim, Tapuya, Temonhá, &c., which may be seen in-shore in running along the coast; the first of these is navigable for coasters, the others will not admit even boats. The shore is bordered by the Recife; and westward of Jericoácoará at from one to 4 miles distant there are from 4 to 8 fathoms water, over oaze, sand, broken shells, or coralline substances. Off Jericoácoará the bottom is composed of small red and white stones; and off Paranaíba, yellow, blue, and red stones. The current in general sets strong to the westward.

JERICOACOARA cove or basin, just to the south-west of the point, is formed by a ridge or ledge of rocks, with which the coast is bordered. The entrance, a narrow opening in the reef, is not practicable even for canoes except at high water, having but little depth and choked by weeds; inside the water is smooth. The village of the same name consists of a few huts, occupied by the Sertanejos, or the inhabitants of the Sertão, or interior country. These huts are only temporary, covered with skins of cattle as a protection from the wind, and remain here only while the coasters come for hides, &c., which are procured from the numerous animals in the neighbourhood.

By remaining some days at Jericoácoará, vessels might procure cattle and poultry at a low price, by giving timely notice to enable the people to bring them to the coast, and the supplies may be depended on. No vegetables fit for eating are to be obtained; and the only fish procurable are thrown upon the rocks by the heavy sea and left there. Water may be obtained by digging wells on the beach.

TIDES.—It is high water, at Jericoácoará, full and change, at 11 h. 30 m.; and the rise is from 10 to 12 feet.

THE RIO DE PERNAIBO or PARANAÍBA is one of the largest rivers in Brazil; and in a commercial point of view is of the highest importance. It is formed by three streams of the same name, that take their rise in the borders of the sierra, which bounds the province of Piauí on the south-west. The first tributary is the rio Boças, the only one, in fact, that joins it on the left bank. Near this confluence, the rio

Urussuhy enters it on the right bank, from the same sierra. At 84 miles farther down, the Gurguea, having taken its rise in the sierra of the same name, and formed in the early part of its course the lake Pernagoa, is incorporated with it.

At 108 miles lower down, it receives the Caninde, which flows from the Sierra dos Irmaõs to the south-east, and at 18 miles farther the Poty falls into it. After 132 miles of its course, the rio Longa falls into it; a little below which a small arm issues from the Pernaibaõ to the east, and forms a large lake, called Encantada, the island between it and the river being about 5 miles in length. At 21 miles farther down, this river divides itself into two unequal streams, and ultimately enters the ocean by six branches separated by a group of low islands composing its delta, the five of which next the sea are never overflowed, and afford excellent pasturage for cattle.

The eastern branch is called Iguarassu, and those following westward, the Barra Velha, the Barra do Meio, the Barra do Caju, the Barra das Canarias, and the Tutoya, by which latter the small river of the same name is discharged. The distance between the Barra de Iguarassu, the eastern branch, and the Barra de Tutoya, the western, is about 36 miles. The land which separates the different branches of this river is low, almost inundated in the rainy season, and forms a curve to the northward.

It is said that for nine months in the year the land is here enveloped in haze, which, added to the heavy sea and strong westerly current which constantly prevails, renders caution necessary in approaching it. In fact, so uniform is the coast that the pilots frequently mistake one point for another. The distance of Villa do Pernaibaõ from the eastern bar is about 8 miles. The Barra de Iguarassu and the Barra Velha, the two easternmost passages, have become unnavigable, except for small vessels. Vessels now enter by the western mouth the Barra de Tutoya, where a pilot may be obtained.*

A reef, called the Pedra de Sal, lies between the Barra Velha and the Barra do Meio at about a mile from the shore. The water is very muddy over oaze and sand along the mouths of the river, and at the distance of 4 or 5 miles from the land there are 8 and 10 fathoms water. The Tutoya harbour is the only one along the extensive line of coast from Bahia to the Amazons, that can be entered at any time of the tide by vessels drawing from 14 to 15 feet; the entrance to this branch of the river is said to be about 6 miles in breadth, and has depths of 5 and 6 fathoms.†

* Nautical Magazine, Vol. i.

† We have very little information about this part of the coast; it has not yet been correctly surveyed, and caution is required.

The COAST westward of the Barra Tutoya to the entrance to the river Perçuicas gradually decreases in height, and is composed of white sandy downs, but wooded in the interior. The shore has the appearance of linen or clothes spread on it, and has received the name of Lançoës Pequenos (Little Sheets), in contra-distinction to a more extensive range westward of the Perçuicas, named Lançoës Grandes.

The river Perçuicas separates the Lançoës Grandes from the Lançoës Pequenos. It is sufficiently deep for the construction of large brigs at some distance within its mouth; but its interior navigation is difficult. The shoal of the same name is said to lie between 7 and 8 miles from the shore, but M. Roussin says, in keeping from 8 to 10 miles from this part of the coast, a vessel will be at a sufficient distance from the outer edge of this danger, and in not less than 14 fathoms water; the chart, however, gives a less depth at this distance from the land.

The coast westward of the Perçuicas trends about N. W. by W. $\frac{1}{4}$ W. for about a distance of 52 miles, and it resembles that which precedes it to the eastward. For about 36 miles between the meridians of about $42^{\circ} 45'$ W. and $43^{\circ} 12'$ W. the downs continue to be of bright sand, but of moderate height, and are called the Lançoës Grandes (Great Sheets). Nothing can more resemble than they do the appearance of white linen spread on the shore, and which is a most useful mark for this part of the coast. It is advisable for vessels bound to Maranhão from the eastward to sight these downs before proceeding westward, but from there being no back ground or any thing to catch the eye, it is difficult to judge the distance from the land, and the only guide is the lead.

Immediately to the westward of the Lançoës Grandes the coast trends to the south-westward, and entirely changes its appearance. From being barren and devoid of verdure, it becomes covered with trees and brush-wood. The shore is low, and called the Praya das Mangues Verdes, or Beach of Mangroves. The sudden transition of colour between it and that of the Lançoës Grandes, renders it impossible to mistake it.

The EMILY SHOAL, having $2\frac{1}{2}$ fathoms water over it, with 7 fathoms around it, was discovered by the grounding of a French vessel. It is said to lie N. by E. of the most remarkable sand-hill of the Lançoës Grandes, in about lat. $2^{\circ} 18'$ S., long. $43^{\circ} 7'$ W., at 7 or 8 miles from the land; and on which other vessels are said to have struck. It is probably one of many other dangerous reefs off this part of the coast, which is imperfectly known.

The CÆSAR SHOAL, on which a French vessel of the same name struck in 1824, is said to lie nearly in the direction between the above position of the Emily and the north-east extreme of the reefs extending from Santa Anna island, and at about E. by N. $\frac{3}{4}$ N., 14 miles from the lighthouse. It

is very dangerous, and extends about $3\frac{1}{2}$ miles east and west, and about 3 miles north and south ; the bottom here is very uneven.*

SANTA ANNA ISLAND.—This island, about 10 miles in extent, and a little more elevated than the Mangues Verdes, which precedes it to the eastward, is covered with mangroves, and other trees. There is a considerable resemblance between the two, but, as they are separated by a large open space, the island, with its lighthouse, cannot be mistaken. The lighthouse is white and may be seen from the deck of a vessel at the distance of 10 or 12 miles, and from aloft at about 15 miles. The island is surrounded by reefs on which the sea breaks, and from its north-east end they extend in an E.N.E. direction for about 8 miles. The breakers are seldom seen until the land is well in sight. There are from 7 to 24 fathoms water, sandy bottom, close to them; and a vessel having made the breakers may steer along their northern side at a distance of from one to 2 miles.† The channel between the island and the main land leading to San Jozé bay is very little known, and the flood tide runs rapidly into it.

LIGHT.—On the east side of Santa Anna island, is a white square tower 80 feet high from base to vane, which exhibits at 70 feet above high water a *revolving* white light, attaining its greatest brilliancy every *eighty seconds*, and visible in clear weather from a distance of 14 miles.

ST. JOZÉ BAY.—At about 14 miles south-west of Santa Anna island is that of Maranhão; the passage between them is choked with reefs, very little known, and leads to the inlet of Bahia de St. Jozé, between Maranhão and the main, where there is a dangerous and intricate channel to the anchorage of St. Luiz de Maranhão. But this channel is seldom taken by any vessels, and then only by entering the bay between Santa Anna island and the main by mistake, or having been set in by the flood-tide, which runs rapidly, or at a rate of $2\frac{1}{2}$ or 3 miles an hour, to the south-west towards the bay.

MARANHAO ISLAND. separated by a narrow channel from the main land southward of it, lies in an E.N.E. and W.S.W. direction, about 28 miles in length, and 15 in breadth. It is fertile and well wooded. The town of San Luiz de Maranhão, and capital of the province, stands at the north-west extremity of the island, upon a neck of land about 90 feet above high water. It is about a mile in length, and half a mile in breadth, divided into two parishes, and contains with the cathedral thirteen churches and chapels, three monasteries, one recolhimento of

* Capt. Buckle, of H.M.S. *Growler*, 1843, says :—On two occasions I searched for the *Cæsar* shoal, and passed as nearly as possible over its assigned position, without decreasing the water or observing any indication of a shoal.

† See Chart :—South America, East Coast, Sheet 3, No. 1,803, scale, $m = 0.05$ of an inch.

educandas, and six hospitals, of which the Misericordia is the principal. It has a lyceum, a Latin school, two primary schools for boys, two for girls, four private schools, and an ecclesiastical seminary in one of the monasteries. There is also a very good hospital for merchant seamen, which is kept up by certain charges on all vessels arriving.

Maranhã is said to be better built than any other town in Brazil, and ranks as the fourth in the empire. It exhibits a general neatness, and an air of enterprise, which rarely appears in the other towns of the empire. None of the churches are unusually large or sumptuous, but many of the private dwellings are of a superior order. The walls are massive, being composed of stone broken fine, and laid in cement. There are within its bounds but few huts, or indifferent houses. The town extends over two hills, and consequently a valley.

The rise and descent in the streets, which are ill paved, are in many places very abrupt. Scarcely any carriages are used, and there is only one good carriage-road in the entire vicinity, which leads a short distance out of town. The streets are generally at right angles, and by the agency of wind and rain are kept clean. There are several ornamental squares, some of which are bordered with trees. One of the most picturesque walks within the precincts of the city is the public cemetery. There is also a protestant cemetery.

The year at Maranhã may be divided into two seasons. The winter or rainy season commences in December and ends in May, and the summer follows, and continues during the other months of the year. The first of these seasons is that of the rains; they fall abundantly, accompanied by heavy squalls, particularly during the months from February to May, and even a part of June. The thunder and lightning are then almost constant, and, in the squalls, the wind blows with great force from North round by east to S.W. Hurricanes are not experienced at Maranhã; and in the worst part of the year there are long intervals of tolerably fine weather.

Rain falls sometimes during summer, and in this season the winds blow mostly from E.S.E. round by east to N.E. with a force of 7 to 8 during the day, but much lighter at night, these being the general winds. At the change of season from dry to rain, the winds are variable and incline to the westward. The temperature of the air is high in the town, more especially from the month of December to that of June. St. Luiz, standing on the west side of the island, does not experience the full force of the winds from the eastward, those which reach it being weak. It is, however, tolerably healthy, and no serious endemic sickness is known. In the time of the rains there are some few cases of fever, which generally yield with proper treatment. The population of the town may be about 40,000.

The exports consists in cotton, rice, sugar, hides, ginger, ipecacuanha, &c. The number of vessels cleared inwards from foreign countries in 1857,

was 68, amounting to 18,491 tons ; and the number cleared outwards was 66, equal to 21,957 tons ; whilst in the coasting trade, 63 vessels of 8,488 tons cleared inwards, and 59 vessels of 7,999 tons cleared outwards. In the same year the value of the imports amounted to 2,988,557 milreis, and the value of the exports was 2,234,183 milreis.

THE BAY of SAN MARCOS is formed by the west coast of Maranhão and the main land. Its entrance lies about S.W. and N.E. ; its least breadth is about 7 miles, and from the parallel of the morro Itacolomi it extends southward for about 22 miles to the harbour and town of São Luiz de Maranhão ; north-west of which, at a distance of 9 miles, on the main land, is the town of Alcantara. The bay is bounded on either side and encumbered with dangerous shoals, which require the greatest caution in approaching. It is, however, navigable for vessels of the largest draught. A vessel having made the land, and not sufficient daylight for entering the bay, should stand off for the night, keeping on the meridian of Santa Anna lighthouse, and at such a distance as to ensure being in the fairway in the morning.

THE COROA GRANDE.—These extensive reefs surround the north angle of Maranhão island, over a space of about 15 miles east and west, the western edge being in about long. $44^{\circ} 6' W$. They extend off about 13 miles, the northernmost part of the breakers being in lat. $2^{\circ} 11' S$. These reefs are divided into several ridges, on the three principal of which the sea generally breaks, but not always. It has been observed that the sea always broke during the ebb tide, and that the reefs do not show during the second half of the flood.

They are, however, generally well defined, steep-to, and at a distance of a mile on the north and west sides there are from 22 to 7 fathoms water ; but they should not be approached nearer than 2 or 3 miles. The prevailing winds being from the eastward, enable vessels bound to São Luiz to pass these dangers at a prudent distance, and reach that anchorage without tacking. From the north edge of the Coroa Grande, the island of Maranhão will be seen in clear weather ; the island is higher than that of São Anna, wooded, and intersected with white cliffs.

SAN MARCOS, or St. Mark point, the north-west extreme of Maranhão island, gives its name to the bay. It is a high bluff point, with a fort and lighthouse on it. A broad shelf surrounds the point to the north to the distance of a mile, and to the south-west, as far as Areas point, the outer edge of the sandy flat is more than 7 cables from the shore, and which forms the south-east boundary of the anchorage outside the harbour.

THE MORRO ITACOLOMI rises on the main land at the north-west extreme of the bay of São Marcos, nearly on the parallel of the north extreme of the Coroa Grande. When first seen it appears like a small

round islet; it is covered with trees, and in clear weather may be seen from 15 to 20 miles. By this isolated mount the coast may be readily known; the land north of it forms a deep bay, and to the southward it is composed of low red cliffs, trending about S.S.E. There is no similar mark in the vicinity, and it is therefore a good landmark and point of departure.

At the distance of $3\frac{1}{2}$ miles southward of the morro, is Pirajuba, a cliffy point, and nearly 9 miles farther on is Pirarema point, with two hills between 2 and 3 miles north of it. At about half a mile southward of the latter point is a white spot in the land, and beyond it at a distance of $2\frac{1}{2}$ miles is Raymondo point. At nearly the same distance farther to the south-west is Tatinga point; here the land trends westward, and at the distance of $1\frac{1}{2}$ miles is the town of Alcantara, with the island of Livramento in front of it. The town of Alcantara stands on a hill; the houses are built of stone, many of them two storeys in height, but the greater part have a ground floor only. It has a town-hall and several churches. A vessel may anchor off it; the water is deep close to the shore.

BANK do MEIO.—In the middle of the channel between the Coroa Grande on the east, and the main-land on the west, is a danger called the Bank do Meio or Middle, composed chiefly of fine light gray sand with black specks. It lies in a N.E. and S.W. direction, with its centre curving a little westerly, $6\frac{1}{2}$ miles in length, and with a mean breadth of half a mile. The depth of water over it varies from 13 feet to 5 fathoms, the shoalest part being $1\frac{1}{2}$ miles from the south-west end. The north-east end is $2\frac{1}{4}$ miles from the western edge of the Coroa Grande reefs. The western edge of the bank is steep-to, and its distance from the land renders a vessel's approach to it uncertain. Anchors sink deeply into the sand.*

From the north end of the bank Itacolomi lighthouse bears N.W. by W. $\frac{1}{2}$ W., and Pirarema point W. by S. $\frac{2}{3}$ S.; but the land from here will not be distinctly seen, unless the weather is very clear. Tatinga point bearing S.W. by W. $\frac{1}{4}$ W. leads close to the north-western elbow. From the south extreme of the bank Tatinga point is on with the centre of isle Livramento bearing W. by S. $\frac{1}{4}$ S., and the white spot southward of Pirarema point W. by N. Fort San Marcos bearing S.S.W. $\frac{1}{4}$ W., leads close to its south-west side.

THE COROA de PEIXADA (Fishing Bank) extends for more than a mile in an E.S.E. and W.N.W. direction, having from $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water over it. It is steep-to on its east and west sides, and lies on the parallel of and about 13 miles from the morro of Itacolomi. This bank offers no danger to vessels under 16 feet draught, but affords the means of ascertaining their position when steering on the parallel of Itacolomi.

* The pilots, in 1863, state that there are only 9 feet water on the south part of this shoal.

The COROA das ALMAS.—From Pirarema point on the main land an extensive uneven flat trends in an irregular curve to the north-east and northward as far as the parallel of Itacolomi. It is called the flat of Pirajuba, having from $2\frac{1}{4}$ to $6\frac{1}{2}$ fathoms water over it, and extends eastward to a distance of 7 miles from the land. On its outer edge is a small patch of about a third of a mile in extent, with 11 to 14 feet on it, named the Coroa das Almas. Tatinga point, just open of Raymondo point, northward of it, bearing S.W. $\frac{1}{4}$ S., leads more than a third of a mile eastward of it. This flat is steep-to.

The BARRAGE da CERCA extends nearly N.E. and S.W. It is $2\frac{1}{2}$ miles in length, and rather more than 4 cables in breadth, with one fathom on its shoalest part at low water, which is near the centre, and on which in many places the sea breaks. The bank lies about $1\frac{1}{2}$ miles from the north-west end of Maranhão island, and between is the road of San Luiz.

The HARBOUR of SAN LUIZ is formed by a creek or inlet in Maranhão island, which runs in between Areas point on the north, and that of Bomfim at $1\frac{1}{4}$ miles distant on the south. Between Bomfim point and the town east of it the distance is nearly three-quarters of a mile, but an extensive mud bank, partly dry at half tide, extends across from the south-west side of the harbour, and to the northward of the point to about $1\frac{1}{2}$ cables of Areas point, which contracts the navigable part of the harbour to a breadth of about $1\frac{1}{2}$ to $2\frac{1}{2}$ cables, with depths varying from 13 to 24 feet at low water. The bar is formed at nearly half a mile north-westward of Areas point, having a narrow channel into the harbour, with 13 feet at low water.

At about $2\frac{1}{4}$ miles westward of Areas point is the islet of Medo, about half a mile in extent, and about half a mile north-east of it are some rocks which uncover at low water. They are surrounded by a bank, between which and the flats extending from the shore is a channel named Boqueirão, about 2 cables in breadth, carrying from $5\frac{1}{2}$ to 13 fathoms water.*

Supplies.—Vessels will find all necessary supplies at Maranhão. The water for shipping is good, but not very abundant, it is supplied by canoes at the rate of 3,000 reis, or about 6s. 9d. per ton; cattle may be procured with facility, and particularly on the main land. Vessels can repair, beach, and if necessary, heave down.†

* See Chart:—Maranhão Road and Port, No. 535, scale, $m=1\cdot0$ inch.

† H.M.S. *Virago*, in November 1856, was grounded on the beach in the creek at the entrance to the rio San Francisco, under the church of Nossa Senhora dos Remedios which is used for the same purpose by the Brazilian Mail Company; but there is another place used by the Government under the arsenal, at the western part of the town.

LIGHTS.—On Itacolomi point, at rather more than half a mile E. $\frac{3}{4}$ S. from the Morro, is a square tower 75 feet high from base to vane, which exhibits at 147 feet above high water a *revolving* light, attaining its greatest brilliancy every *minute and a half*, and should be seen in clear weather from a distance of 15 miles. The light shows white and *red* alternately. On fort San Marcos, at $1\frac{1}{2}$ miles north-east of the entrance to San Luiz harbour, is a lighthouse which exhibits a *fixed* white light, visible 10 miles.

There is also a small harbour light exhibited at Alcantara as a guide to that anchorage.

PILOTS may be obtained by making the usual signals. Vessels requiring them should heave to about 2 miles northward of fort San Marcos.

TIDES.—It is high water in San Luiz harbour at the Custom House quay, full and change, at 7 h. 0 m. ; springs rise $16\frac{1}{2}$ feet, and neaps $10\frac{1}{2}$ feet. At the anchorage outside the harbour, the flood sets S.S.W. and the ebb N.N.E. South of the bank do Meio the tide sets S.W. and N.E. The average rate at neaps is about $1\frac{1}{2}$ miles an hour, and during springs $2\frac{1}{2}$ miles an hour.

ANCHORAGES.—A vessel which has but a short time to stay in San Marcos bay will find a good berth in 10 or 11 fathoms water, sand and mud, with smooth water, in the road of Alagoas, north-east of fort San Marcos. The best anchorage in the road outside the harbour is with fort San Antonio on Areas point, bearing S.E. by E. $\frac{1}{2}$ E., distant from three-quarters to a mile, in $7\frac{1}{2}$ to 11 fathoms water, over sand, gravel, and shells. Small vessels anchor nearer the bank and rocks of Isle do Meio. This anchorage is convenient on account of its proximity to the port ; but during strong winds the sea is frequently heavy, which sometimes occasions the loss of anchors.

There is anchorage always sheltered from the sea, and which is best adapted for vessels of large draught, southward of Isle do Medo, in 11 fathoms water, sand and mud. It is still better southward of Ataki point, in from 15 to 16 fathoms water, mud. The tide here is much less rapid, and the sea smooth ; but that south of Medo has every security, and the advantage of being nearer the town. Vessels should not anchor too near the bar, as the bottom here is of quick sand, into which the anchors sink deeply, with occasionally patches of rocks. Lieut. A. Tabuteau, says, "H.M.S. *Spy*, in 1860, was anchored with fort San Antonio, bearing E. by S. ; San Marcos point N.E. by E. ; and Isle de Meio, W.S.W. On weighing the anchor, the cable was found to be worn down in several places to a quarter of an inch in diameter, and one link was cut through."

DIRECTIONS.—As the prevailing winds are those from the eastward, it will be prudent for a vessel bound to Maranham, from whatever quarter, to make the land to the eastward, about the Langeos Grandes, and then steer to the north-westward along the coast, which should not be approached nearer than 10 or 12 miles in from 10 to 15 fathoms water. As the flood tide runs rapidly to the south-west, towards St. Jozé bay, it is necessary that a vessel in passing the Mangues Verdes should steer well to the northward, clear of Cæsar's shoal, page 241, and the breakers off Santa Anna island. The Santa Anna reefs are steep-to, and when the breakers are seen can be passed at a prudent distance, taking care to allow for the flood tide. If the wind is light or the weather hazy, a vessel should give them a wide berth, or she may be drifted on them, or else to a critical position in the channel leading to St. Jozé bay.

Having passed 8 miles northward of Santa Anna reefs, and being on the meridian of the lighthouse, steer W. $\frac{1}{2}$ N. for 26 miles, making due allowance for the tide, the mean rate of which may be taken as $2\frac{1}{2}$ miles an hour, the flood running about S.W. by W., and the ebb N.E. The above course will carry a vessel about 3 miles northward of the north extreme of the great reefs named the Coroa Grande, the breakers on which, if there is any sea, will in all probability have been seen, but the mariner must not depend on seeing them.

Having made good W. $\frac{1}{2}$ N. 26 miles from the meridian of Santa Anna lighthouse, steer West for the Morro Itacolomi, which may be seen like a small islet in the horizon, at a distance of from 15 to 20 miles. A vessel intending to take the channel eastward of the Meio or Middle bank for the anchorage at St. Luiz, and the breakers of the Coroa Grande having been seen, should steer about S.S.W. $\frac{1}{2}$ W. in not less than 12 or 10 fathoms water along the reefs and north-west side of Maranham, passing probably over the north-east extreme of the Meio bank in 4 to $5\frac{1}{4}$ fathoms at low water.

If the weather is clear, the north part of Maranham will be seen at the same time as the breakers of the Coroa Grande. The island is higher than that of Santa Anna and will also be known by its white cliffs. In proceeding to the southward San Marcus point, with its lighthouse, will be seen; it is elevated, and terminates in an abrupt point. The lighthouse should not be brought to bear southward of S.W. by S. until the white spot near Pirarema point bears W. by N., in order to avoid the shoal part of the Meio bank, then a vessel may steer for it. When the lighthouse bears S. by W., distant 2 miles, steer about S.W. $\frac{1}{2}$ W. for the centre of isle Meio, which will lead midway between the bank da Cerca and that bordering the shore, for the anchorage. By keeping the Boqueirão open a vessel will be eastward of the bank da Cerca.

But the best and most frequented route to San Luiz is that westward of the Meio or Middle bank, or between it and the great flat of Pirajuba extending from the main land. A vessel in using this passage should steer to the westward on the parallel of the Morro of Itacolomi (page 244), to within a distance of 12 miles. In this track there are from 15 to 18 fathoms water until a vessel arrives at the Coroa Peixada. Having sounded on this bank in $3\frac{1}{2}$ or $4\frac{1}{2}$ fathoms (page 245), steer S. $\frac{1}{2}$ W. for a distance of 5 miles, or until Tatinga point, the extreme of land in sight to the south-west, bears S.W. $\frac{1}{2}$ W. ; then steer S.W. $\frac{1}{2}$ S.

When fort San Marcos, which is seen like a small islet in the horizon, bears S. $\frac{1}{2}$ W. steer for it, and proceed as before. Vessels of more than 16 feet draught should keep a little to the southward of the parallel of the Morro Itacolomi, so as to avoid the Coroa Peixada. In standing to the southward in order to avoid the Coroa da Almas, Tatinga point should not be brought to bear southward of S.W. To avoid the Meio, do not bring Tatinga point westward of S.W. by W. $\frac{1}{4}$ W. until nearly on the meridian of fort San Marcos. If the night is far advanced, or the weather thick, the seaman will do well to anchor.

ENTERING the Harbour.—It is not advisable to enter the harbour of San Luiz without a pilot, but in case of emergency the following directions should be attended to* :—At low water the banks are sufficiently uncovered to show the channel ; but not so at high water. In the latter case a vessel should give Areas point a berth of half a mile ; and when San Francisco point is open about a sail's breadth of the east angle of the barracks (a large white building), haul up so as to pass about a cable south of fort San Antonio, keeping along the weather side of the harbour ; unless it is exactly high water, the set of the tide should be considered, as a vessel may be set on the south bank.

When nearly abreast San Francisco point, steer a little to the southward to avoid the extreme of the bank which extends from it to the south-west 2 cables. The sea sometimes breaks heavily on the banks at the entrance of the harbour, which renders it dangerous for a vessel to ground ; but inside the harbour it only occasions loss of time.

OUTWARD Route.—Vessels leaving the anchorage of Maranhão should get under way at high water, and when outside the bar, bring fort San Antonio to bear E.S.E., and steer about W.N.W., southward of the bank da Cerca, which will be passed when the rock north-east of isle do Medo is open eastward of the southernmost of the two Espera islets ; then haul to the wind. The lead is a sufficient guide in crossing the tail of the bank.

A vessel may tack as convenient whilst the white spot south of Pira-

* The pilotage into the harbour is about 28 milreis ; and from the harbour to Pará (without stoppage) and back for a vessel of 15 feet draught 400 milreis.

renda point bears northward of W. $\frac{1}{2}$ N.; which bearing leads over the tail of the bank do Meio. When to the northward of this line, stand towards the bank do Meio until fort San Marcos bears S.W. by S.; and towards the Pirajuba bank until Tatinga point bears S.W. These banks are steep-to, and the lead gives no indication of a vessel's approach to them.

Small vessels may stand from the Coroa Grande bank to those of Pirajuba and Almas, crossing the Meio at any time of the tide, as there is never less than 13 feet water on it (*see note, page 245*); but as the ebb is stronger on the western side of the bay, it will be better to keep on that side. It is for this latter reason that the pilots prefer the passage west of the Meio for large vessels, although the lead is a better guide eastward of it.

A vessel having to leave late, and unable to get out in a single tide, should take the eastern channel, in order to choose an anchorage at the turn of the tide. The sea is here smoother and the bottom better than in the western channel. The parallel of the morro Itacolomi is considered as being out of the bay, and on this line the pilot leaves.

The **MANOEL LUIZ**, a dangerous group of conical rocks, some of which are level with the surface of the water, lies in an E. by S. and W. by N. direction, about 3 miles in length, and more than half a mile in breadth. They bear N. by E., distant 77 miles from Itacolomi lighthouse, and are separated from each other by unequal distances, and on several of the sunken rocks there are from 5 to 15 feet water, with 8, 10, and 12 fathoms close-to. The sea breaks on them only at short intervals during low water; it is therefore almost impossible to see them unless passing very near.*

The breakers, which rise suddenly, have the appearance of the spouting of a whale, while the sea is smooth about them; and when they cease they leave masses of white foam, which continue for some time. When the sky is clear the rocks may be distinctly seen under water, appearing in large black patches; but are not visible until too near for a vessel's safety. After 2 h. flood, and at the distance of half a mile, it is probable that no traces of them will be seen if the sea is smooth. The west end of the reef is in lat. $0^{\circ} 51' 25''$ S., long. $44^{\circ} 15'$ W.

TIDES.—It is high water at the Manoel Luiz reef, full and change, at 5 h.; and the rise is 12 feet. The tide runs regularly six hours each way the flood to the S.W. and the ebb to the N.E., one mile an hour.

VIGIA of M. DA SILVA.—This shoal is said to have been discovered by M. da Silva, an officer in the Brazilian navy; but its exact position, if in existence, has not yet been verified. The place assigned it is about 21 miles northward of the Manoel Luiz, in lat. $0^{\circ} 32'$ S., long. $44^{\circ} 18'$ W.; and it is questioned if this latter shoal, before its position was verified by Baron Roussin, has not been taken for it.

* *See Plan:—Manoel Luiz Bank, on sheet 4, No. 528.*

SOUNDINGS.—No reliable indication of a vessel's distance from the Manoel Luiz can be gathered from the soundings; the depth and nature of the bottom near them are so variable that no correct data can be deduced. The white sandy bottom with black and red specks, comprised between the meridian of the breakers of the Coroa Grande and that of the eastern coast of the main land near them, extends from 30 to 45 miles northward of the entrance of San Marcos bay; these soundings are not always the same, as sometimes they are found of a different nature. Beyond this limit (as on the bank eastward of the meridian of the Coroa Grande) the bottom is sand and broken coral.

The ground is of the same nature immediately round the Manoel Luiz, to the east, south, and west of it; but it is sometimes, though rarely, mixed with coarse gravel and broken shells. The difference of depth near this reef is not, either, sufficiently marked to indicate an approach to it, as, from the depth of 22 fathoms water, it suddenly decreases to 10 fathoms. A line, however, drawn north-west and south-east from a point 45 miles east of the reef will separate the depths of 90 fathoms and upwards from those of about 50 fathoms. Thus a vessel in this latter depth, approaching from the eastward, will be at least 45 miles from this dangerous reef.

CUMA BAY.—From Itacolomi point the coast turns abruptly to the west, and forms by a deep indentation Cuma bay, the northern point of entrance to which is terminated by a low woody island, named Ilha dos Atins. The bay is from 15 to 18 miles in length, and its entrance about 7 miles in breadth; it is encumbered with shoals, and at its mouth is a small island called Ilha dos Ovos or Taruoca, where there is said to be anchorage; but the channel leading to it is shallow, and of difficult navigation. Several rivers, of which the principal is the Guimarens, empty themselves into the bay. The tide here is strong, the flood runs W.S.W., and the ebb E.N.E.

THE COAST from Ilha dos Atins trends to the N.W. by N., intersected with bays, rivers, and a chain of islands as far as the group of San João. The approaches to them are encumbered by sand-banks, separated by narrow channels, practicable only for small vessels. At 3 miles N. $\frac{3}{4}$ W. from Ilha dos Atins is that of Tucunanduba, forming with Tru island, which immediately follows it, the bay of Tucunanduba. Beyond Tru island is Cauoca point, where the coast running westward forms the bay of Cabello da Velha, at the northern point of which is isle Mangas.

This bay is deep, and, like that of Cuma, receives several streams; it affords anchorage for small vessels, reached by a channel on the north shore, but, like all those on the main land, its navigation is difficult. Between isle Mangas and Tury point about 14 miles to the north-west of it, at the entrance to the bay of Turyrana, are the islands of João-sinho, Gajiru-

tiva, and Carapatitiva, fronting the coast. The bay of Turytana is bounded on the north-west by the isles of San João, which separate it from that of Turyassu. The former is encumbered with shoals, and is considered as closed to navigation for any but small vessels.

ISLANDS of SAN JOÃO.—These islands are low, like those and the coast which precede them. They are separated from each other only by narrow channels, and on the north-east part there are sandy downs by which they cannot fail to be recognized. The most eastern of the group is detached, and to its summit, which is tolerably high (being 70 feet above the sea) compared with the land near, is remarkable, and entirely without vegetation. It is composed exclusively of white sand, which has procured for it the name of Lançoes. From the east end of the group, a bank of sand extends to the E.N.E., on which the sea breaks; on the north side is a flat of yellow sand, steep on the N.W., but sloping gradually to the N.E.*

At the distance of 45 miles N.E. by E. $\frac{1}{2}$ E. from these islands is the Manoel Luiz reef. The channel which separates it from the islands is clear, and sufficiently large to be safe. Now that the exact determination of the Manoel Luiz ridge of rocks has fixed the northern boundary of the channel, vessels leaving the bay of Maranhão frequent it with safety. The breadth of the channel, the close vicinity of the point of departure, the change from soundings of yellow sand to coral mixed with gray sand, and the gradual increase of the depth of water northward of the parallel of the San João islands, are reasons for dispelling any fears with regard to this passage.

Commander H. V. Haggard, in H.M.S. *Virago*, 1856, says, "the nature of the bottom changing from fine white sand with black specks, to coarse brown sand with stones and broken shells, denote that a vessel is northward of San João."

ANCHORAGE.—There is anchorage on the western side of the San João group to the north east of the Muriciput bank, which is more sheltered as a vessel proceeds to the south, or nearer the land. It is however prudent not to bring the mouth of the first river on the west side of the group to bear eastward of S.E. $\frac{1}{4}$ E., and not to go into less than $6\frac{1}{2}$ fathoms water. A vessel of light draught requiring repairs, and consequently having to stay a long time at this anchorage, could, in passing through the narrow channel which runs along the principal group, anchor between them and the island Jabaroça, where she would be more sheltered than outside.

* See Plan:—San João Bay, No. 1,648, scale, $m = 0.5$ of an inch.

Turyassu bay * is bounded on the east by the San João islands, and on the west by Tamandua point. The bay has an opening of about 20 miles in breadth, almost entirely occupied by sand-banks.

The COAST.—From San João islands to Salinas point the land all along is much the same in appearance, consisting of low hills tolerably wooded. Tumandua point projects more than 7 miles to the north-east, and off it is the extremity of a line of breakers, which continues along the coast at a distance of from 5 to $7\frac{1}{2}$ miles as far as Cape Gurupi, which it approaches to about $1\frac{1}{2}$ miles. This bank, broken in several places forming entrances to the small bays, surrounds also the numerous islands near the mainland which border the coast. Near Tamandua point, the small island of Motuoca can be just seen, separated from Acara island by Motuoca bay.

Then along the coast westward are the islands Acara, Maracasumé, Pirucana, and San João-sinho, each of which gives its name to the bay westward of it. The bay of Pirucana has an anchorage difficult of access through the banks which extend off to the north-east of the island of that name.

The Morro de Pirucana, an isolated mount, is remarkable, being the only one on this part of the coast, and the first westward of the San João islands. To the west of the bay of San João-sinho are the islands of Irmaoens and that of Pria, separated by the bay Trumahi. From the island Pria to cape Gurupi the coast recedes, forming a large bay, with the small islands Sumacas, Redonda, Gurupi, and Rasa, lying along its entrance, which occupies a space of about 14 miles.

The river Prias falls into the eastern part of this great bay, to which it gives its name ; the western side is bounded by cape Gurupi, and is called the bay of that name.

CAPE GURUPI.—This cape is remarkable for its apparent distance from the adjoining land, and by the sands at its foot, which accumulate in some places into heaps or steep banks. It may be also recognized by the islands near it, which make it the best landfall for all the coast.

The surest marks, however, for knowing the cape are three hills or mountains rising one above another at equal distances, like steps of a ladder, from the shore at the head of Gurupi bay to a distance of 25 miles in the interior. Although only of moderate height, they are remarkable, because the land eastward and westward is low, and can hardly be seen at a distance of 14 miles, whilst in clear weather these hills or mountains can be seen at a distance of 25 miles.

PRIA-UNGA BAY.—Westward of Cape Gurupi is the bay of Pria-

* Tury-assu (Great Tury) in the *lingoa geral* still used among the lower orders and Indians. In Brazil the word *assu* means great, and *mirim* small. The larger portion of the names on this coast belong to the Tapuya language.—M. de Kerhallet.

Unga. The western side of which is bounded by Manejetuba island, and at the head of the bay are three islands, by which it may be known. The Gurupi river with its mouth a mile in breadth runs into the south-eastern part of the bay, and is considered navigable for small vessels.

The bank bordering the coast which approaches to within a mile of Cape Gurupi, extends off to a distance of 4 miles from Manejetuba island, and borders the coast about that distance to the westward as far as the bay of Caiti; it prevents the coast at the head of the bays being clearly observed.

At the distance of 12 miles westward of Manejetuba island is that of Carauassu, forming between the bay of Priatinga; and between the latter island and Anajaes point, at nearly 10 miles farther on, is the bay of Punga.

JAPARIQUES ISLETS.—Punga bay is distinguished from that of Priatinga by the two small Punga or Japariques islets, which are at equal distances from the two sides of the bay. Separated from each other by a small channel of about a mile in breadth, and lying in a line parallel to the track in running along the coast, the Japariques islets never cover each other, but are separated and distinct; this is important, as it prevents their being mistaken for the islands in the centre of Caiti bay, which is separated from that of Punga by Anajaes point.

CAITI BAY.—This bay, the largest on the coast, is remarkable for three islands which divide it into nearly two equal parts, the northernmost island is nearly 4 miles from the head of the bay. This latter island has on its northern side a sandy beach, terminated on the west by a small cliff, by which it is easily recognized. It is impossible to mistake them for the Punga islets, because, as before stated, the latter always appear well separated, whilst the former are blended together, and make almost as one island.

Caiti bay is bordered by the great bank which continues along the coast from Tamandua point. A break in this bank leads to an anchorage westward of the islands, but the channel is difficult to navigate, and only practicable for very small vessels. The river of the same name discharges itself into the southern part of the bay.

MANITJUBA ISLAND is low, woody, and forms the western point of Caiti bay, which it separates from the bays of Coati Paru, and Miriquiqui to the westward; these bays have for their common boundary a slightly projecting point on the north, called Japirica, which is distinguished from the land near it by its being rather higher, and by the reddish colour of its extremity. Also it is remarkable for appearing, particularly from the E.N.E., as an island, round at the top, and well separated from the main land.

At about 22 miles northward of Manijuba point is a bank on which H.M.S. *Growler* found only $26\frac{1}{2}$ feet water. Its position is marked doubtful, and called Buckle bank, after the commander.

CARRO DI MATO.—The west point of Mariquiqui bay is marked by a clump of trees, which are higher than those on the neighbouring coast; and when seen at some distance from the north-east it has the appearance of a fortification, and is known among the pilots by the name of Carro di Mato, by which name the point is known also.

MOUNT PIRAUSSU.—At the distance of nearly 3 miles, S. $\frac{3}{4}$ W., of the village of Salinas is Mount Piraussu, rising above the land near it, and seen in clear weather when coming from the eastward.

SALINAS-FALSAS BAY.—Westward of the bay of Mariquiqui is that of Salinas-Falsas, remarkable from its white sand downs at the eastern point of the bay. Seen at a distance they look like breakers or vessels' sails; one of them in particular, separated from the three principal, and elevated above the water, appears like a boat's sail with the sun shining on it. Soon after recognizing these downs, the western point of Salinas-Falsas bay appears like a small round island, but it is soon seen to be connected with the mainland by small hummocks. This extreme point is called Atalaia, and on it there is a lighthouse.

At about 2 miles from its extremity, which is of a reddish colour, there is a beach with white sand downs, and patches of verdure, the shrubs on the summit being blended with the trees of the interior. A small hillock of white sand at the east end of the beach is remarkable.

LIGHT.—On Atalaia point is a lighthouse, which exhibits a *fixed* white light, varied by a *flash* every *two minutes*, and should be seen in clear weather from a distance of 17 miles. The light shows steady for 70 seconds, followed by an eclipse of 16 seconds, then a flash for 12 seconds, and another eclipse for 22 seconds; total, 122 seconds.

SIGNALS.—Vessels in sight of Atalaia point bound for Pará and wanting a pilot should hoist at the fore a red flag with a white square in the centre. Near the lighthouse is a flag-staff, from which the following flags are used in the signals made to vessels.*

- | | |
|--|---------------------|
| No. 1. A white flag with a blue cross. | No. 3. A blue flag. |
| No. 2. A flag, upper half red, and the lower half white. | No. 4. A red flag. |

No. 2 signifies that there is a pilot at the station, and a boat to take him on board the vessel.

No. 12 signifies the vessel is to wait for the pilot, who leaves the shore immediately.

No. 13 signifies the vessel to wait, as the tide will not admit the pilot to embark.

No. 14 signifies the pilot will go on board before noon.

No. 21 signifies the pilot will go on board after noon.

* Transmitted by Gerald R. Perry, Esq., H.M. consul at Pará, 1863.

No. 23 signifies the pilot will go on board before midnight.

No. 24 signifies the pilot will go on board after midnight.

No. 31 signifies that the vessel wanting a pilot is to send a boat for him, if acquainted with the place, which cannot be done without great risk of losing both boat and crew.

No. 32 signifies that there is no pilot at the station, and for the vessel to wait until one arrives.

Signals are also made from the village of Salinas to the lighthouse ; the following are the flags used with their signification, which are answered from the lighthouse station by No. 1, a white flag with a blue cross.

No. 1. A white flag.

No. 2. A red flag with a white square in the centre.

No. 1 signifies that there is a pilot and boat to take him on board.

No. 2 signifies that there is a pilot, but no boat.

No. 12 signifies that there is no pilot at the station.

Night signals.—At night, a light of the natural colour at the village of Salinas, hoisted at the flag-staff, with another at the gaff, signifies that there is a pilot at the station.

Two lights vertical at the gaff signifies that there is a pilot but no boat.

Two lights horizontally signifies that there is no pilot.

The above signals will be answered from the lighthouse station by a single light.

The night signals made from the lighthouse station to vessels in the offing are the same as those made from the village to the lighthouse, but instead of the natural colour the lights are *red*.

Vessels off Salinas wanting pilots should hoist a light at the fore.

When the signal is made, that the tide does not answer for the pilot to go off, vessels should stand off and on, off on the flood, and inshore on the ebb. Commanders of vessels wishing to anchor, can do so in 6 or 7 fathoms water, with the light bearing S.E. A pilot can more conveniently be received on board with the light on this bearing. Pilots leave the village of Salinas to go on board at high water, which is at 7 h. 30 m. at Salinas, and at the usual anchorage at 8 h. 15 m. at full and change. Attention should be given to the signals made from the lighthouse, and not to those at the village.

The signals will hang from a yard across the flag-staff at the lighthouse in calm weather. At night or in thick weather, if a gun is fired in the vicinity of Salinas, it will be answered by one from the shore, when the vessel should wait until the pilot can go on board. Vessels should approach the coast with great caution, *see* page 260.*

SALINAS BAY.—Coming from the eastward, Atalaia point appears to be the extremity of the coast, but on approaching its meridian other land is seen westward of it, forming Salinas bay, which, at its head, presents a long sandy beach, and some rather low white sand downs. The village

* The pilotage from Salinas to Pará is about 30 milreis, but from Pará to sea 70 milreis.

of Salinas is soon seen, on a wooded plain. At first, its white church is only seen, standing out from the land below it on the second plain and about 60 feet above the sea, but when about 6 miles to the north of the village, the red colour of the roofing of the houses can be distinguished.

The level land on which Salinas stands gradually decreases in height to the west, and terminates with a clump of high trees by which it will be known. The land on the second plain runs to the south-west, is more elevated than that which precedes it to the east, or that which follows westward, and, with Atalaia point, is so remarkable that it cannot be mistaken.

At about 5 miles N. by E. $\frac{1}{2}$ E. of the village, is the centre of a shoal, on which there are from 4 to $4\frac{1}{2}$ fathoms water. It lies S.S.W. and N.N.E. $2\frac{1}{4}$ miles in length, and 1.3 miles in breadth. Between it and the land there is a channel of about $2\frac{1}{4}$ miles in breadth, in one part of which there is muddy bottom. Salinas is the station for the pilots of the river Pará.

Salinas bay is bounded on the west by the island of Praia Grande, which separates it from that of Maracumo; this island is remarkable for having on it a very high tree, and also for a sandy beach on its north-east point. The edge of the great bank bordering the coast passes at about 2 miles distant from the land forming Atalaia point, until the latter bears about S.W., when it trends in the direction of the point, close to it, and round Salinas bay. On the meridian of the village it curves to the northward and passes at $2\frac{1}{2}$ miles north-east of Praia Grande; there it runs a little to the southward and along the coast in a wave line, passing 4 miles to the north-west of that island, and nearly the same distance north of Marapani point westward of it.

MARANDUBA ISLAND.—Marapani point, the north extreme of Maranduba island, bounds the bay of the same name on the west, and is distinguished by a small hummock, and by its sandy shore and downs which, though not very high, are easily recognized, being the only point of the coast which has the same aspect from Atalaia point as far as the river Para. Its recognition is important, because on its meridian is the most northern part of the great bank which borders the coast. The bank trends to the north from the meridian of the west point of Praia Grande island, from thence to the west to that of Marapani point, where it again turns suddenly to the north as far as 4 miles from the point, and then takes a west direction.

The COAST.—From the meridian of Marapani point, the low north point of Cajetuba island is seen, which forms, with Maranduba island, the large bay of Piracumbana, at the head of which is easily distinguished the outline of the island of the same name. Westward of Cajetuba island

is the bay of the same name, which separates the island from that of Curuça, the western point of which terminates abruptly, and is higher than the land between it and Salinas. Tijoca point, westward of Curuça, is low, and terminates in a flat sandy beach.

These two latter points are separated by a deep inlet or river, which takes the name of Curuça; it is of great importance not to mistake Curuça point for any of those near it. At nearly 4 miles from the north-east point of Curuça, the bank bordering the coast* trends to the west-south-west, and round Tijoca point, at about the distance of a mile.*

GENERAL DIRECTIONS.—At a distance of 12 miles eastward of Itacolomi lighthouse, steer about N. by W. $\frac{1}{2}$ W., keeping in not less than 8 fathoms water, and bearing in mind that the flood tide sets W.S.W. $2\frac{1}{2}$ miles an hour during springs, and 2 miles at neaps, and that its strength increases as the depths decrease. The ebb tide sets N.E. at rather a less rate. Should a vessel be becalmed, and drift into less than 6 fathoms water, she should anchor. Having made good 60 miles, a vessel will be on the parallel of the islands of San João, the east point of which can be seen at a distance of 14 miles. In approaching this parallel the nature of the bottom will change, from white sand, to yellow mixed with red specks.

Should it be daylight, and the islands of San João are sighted, the largest will appear in form like a white triangle, fronted by small hummocks covered with vegetation, which at a distance resemble islets. They cannot be mistaken for any other part of the coast, and having made them, they serve as a fresh point of departure. But if the land is not visible, and the vessel is in 8 fathoms water, over yellow sand, she will be on the flat extending from San João islands. In continuing to the northward, the soundings will suddenly deepen to 16 or 17 fathoms, gray sand with black specks, and sometimes mixed with broken shells; † when a more westerly course may be steered, or along the land, keeping between the depths of $10\frac{1}{2}$ and 13 fathoms.

By day the land may be kept in sight, and approached into 8 fathoms water. To this depth the soundings decrease regularly, but inside this depth they are irregular, varying from 6 to 2 fathoms to the edge of the bank. By daylight, in crossing Pirucana bay in 8 or 10 fathoms water, the morro Pirucana will be seen, which is the first mark on the coast westward of San João; although of small elevation, it is easily distinguished in clear weather above the surrounding land. In continuing on in the same depths Pria bay will be crossed, which will be known by the Samacas islands, should the weather be too thick to see the three hills or

* See Chart :—River Para, No. 2,186, scale, $m = 0.2$ of an inch.

† Lieut. de Kerhallet says, Black gravel and small shells, the only soundings of the kind on the coast.

mountains extending inland from the head of Gurupi bay. Cape Gurupi will also be known by the white sand at its foot, see page 253.

Between the San João islands and Cape Gurupi the bottom is composed of gray sand with black specks; but on the meridian of the cape it is very fine black sand, being the only bottom of the kind on the coast, and which serves to indicate a vessel's longitude; soon after the bottom again becomes gray sand with black specks. A vessel's position having been ascertained by sighting Cape Gurupi, or from the nature of the bottom, the course may be continued to the westward in the same depths as before, and the north island of the Caiti group in clear weather will be seen and known from those of Punga by their white sandy beach and relative positions.

On the meridian of Caiti bay the bottom is gray sand mixed with broken shells; sometimes the lead only brings up impressions of large shells. In the middle of the bay is a belt of mud extending N.N.E. and S.S.W. The bank bordering the coast extends more to the north on the meridian of the east point of Caiti bay than elsewhere; it will therefore be prudent to cross the bay in not less than $10\frac{1}{2}$ fathoms water at a distance of 8 miles from the coast. Steering to the westward in not less than 8 fathoms water, Carro Mato point and the sand downs of Salinas Falsas bay will be seen, and finally Atalaia point and lighthouse.

Between San João islands and Atalaia point, a vessel should not stand into less than 8 fathoms water. In a less depth the soundings are irregular, and it is dangerous; whilst seaward the water gradually deepens. On a low and uniform coast like this, the soundings are the surest guide, and the lead should be kept steadily going, and the nature of the bottom studied, especially across the meridians of Cape Gurupi and Caiti bay.

The TIDES along the coast, from the San João group to Atalaia point, are felt at more than 20 miles from the land; the flood near the coast runs to the S.W., towards the bays, at a mean rate of $2\frac{1}{2}$ miles an hour during springs, and $1\frac{3}{4}$ miles an hour at neaps. The ebb sets E.N.E. at about three-quarters of a mile less rate than the flood. It sometimes happens however during the months of March, April, and May, that the strength of the ebb exceeds the flood in the same degree as the flood exceeds the ebb during the other months of the year.

The difference between the strength of the flood and ebb tides is the result of a general set to the westward of from 18 to 24 miles a day during the greater part of the year; but during the months of March, April, and May, the set may be to the eastward at the same rate. The tides are stronger near the coast, which requires more attention when in its vicinity. It is high water at the anchorage of Salinas, full and change, at 8 h. 15 m.

ATALAIA POINT.—Having sighted Atalaia point, it should not be approached in a vessel of large draught nearer than 6 miles or in 10 fathoms water. A vessel of moderate draught, whilst eastward of its meridian, may approach the point to a distance of 3 miles, but in not less than 8 fathoms; and if intending to pass inside the sand-bank lying N.N.W. of the point, and N. by E. $\frac{1}{2}$ E. of the village of Salinas, the point should be approached, when nearly on its meridian, to a less distance than 3 miles, but not within 2 miles.

A vessel waiting for a pilot for Pará, can anchor inside the sand-bank, on muddy bottom, with Atalaia point bearing S.S.E. $\frac{1}{4}$ E., and the village S.S.W. $\frac{1}{2}$ W.; but unless it is calm, it is advisable to keep under way with the village and lighthouse in sight, standing towards the land westward of the village into not less than 5 fathoms water.

CAUTION.—When it may be necessary to send to Salinas, the boat should leave the vessel so as to be at the mouth of the little river west of the village, at about two-thirds flood. The sea breaks heavily on the bar, and it is dangerous to pass at any other time of the tide, and the boat should never wait beyond one-third ebb. Thus, it will be seen, that, in consequence of the coast being so completely bordered with shoals, the pilots can only leave the shore at or about high water.

PARÁ RIVER.—The estuary of this river, between Tijoca point, on the east, and Cape Magoari, the north-east point of Marajo island, on the west, is 33 miles in breadth, and when midway the coast on either side cannot be seen. It is encumbered with numerous banks, and great attention to the lead is requisite. These banks may be divided into three principal groups, the eastern, western, and central. The eastern group is composed of the Braganza, Coroa Nova, and the Coroa das Gaivotas; the latter joining the great coast bank which continues south-west of Tijoca point.*

The land on either side of the river is low, and the eastern shore is one uninterrupted scene of forest green skirting the water's edge. The banks of the river are muddy, affording little facility for landing; and where they do admit it, houses are generally erected. The water is extremely muddy, of a dingy orange brown. Many thatched and cabined canoes of the country are seen, and other small craft with their thin cotton sails, having some resemblance to Chinese vessels. The principal business of the river seems to be carried on in these canoes, which are continually arriving and sailing, and literally crowd the shore near Pará.

They bring the produce of the country from all parts, and come down the Amazons from a distance of 600 or 700 miles. They are navigated by

* See Chart :—River Para, No. 2,186, scale, $m = 0.2$ of an inch.

various tribes, each canoe generally containing a whole family or more of people.

BRAGANZA BANK, the most eastern of the group, is formed of hard sand over a bed of stiff mud. It consists of different ridges, three of which uncover at spring tides; in the channels between them there are nearly 2 fathoms at low water. The west and south sides of the bank are steep; the north and east part forms a flat, over which there are from 3 to 6 fathoms water. Its east side is steep, and from it the water deepens suddenly from 5 to 12 and 18 fathoms.

The north extreme lies N. by W., distant $7\frac{1}{2}$ miles, from Tijoca point; the south-west point, called Espadon, N.W. $6\frac{1}{2}$ miles from the same point; and the south-east point North $3\frac{3}{4}$ miles. As the bank lies in the usual passage on entering the river, and the sea breaks on the north-west side of it at all times of the tide, it is important to make the breakers, as they serve as a mark. It may however happen with a smooth sea, or when the sun is setting, causing a bright glare, that the breakers may not be seen.

The **COROA NOVA** lies S.S.W. of the Braganza bank, and is separated from it by a safe and deep channel of a mile in breadth, called the Poço. The north-east part of this bank is continually changing its position, and the current runs through the channel at a rate of 5 or 6 miles an hour.

The **COROA GAIVOTAS**, southward of the Coroa Nova, and separated from it by a space of about $1\frac{1}{2}$ miles in breadth, is a large bank of sand almost entirely uncovered at low water, and extends towards the coast bank, leaving between a narrow passage navigable for small craft. The Cassard channel between the Coroa Nova and that of Gaivotas is winding, shallow, and not fit for any but very small vessels.*

The **MAGOARI or SANTA ROSA BANKS**, forming the western group, consists of a number of sandy ridges, and, although separated by a narrow channel, may be considered as part of the bank bordering Cape Magoari, which, broken in places, continues along the coast of Marajo island until southward of Coroa isle. These ridges extend eastward from the cape for a distance of 14 miles, having only $1\frac{1}{2}$ fathoms water over them, and on which, in fresh breezes, the sea often breaks; but at times their positions are not seen. From the eastern extremity of these banks Cape Magoari is distinctly seen from the deck of a moderate size vessel.

The flood tide here runs to the W.S.W., and the ebb to the E.N.E. The Coroa Kiriri bank southward of Magoari borders the shore of Marajo island, from which it extends off to a distance of nearly 16 miles, its

† The French brig of war *Cassard*, from which the channel takes its name, grounded here in 1837.

eastern extreme being about $17\frac{1}{2}$ miles in a W.N.W. direction from Tijoca point. It is said to uncover at low water springs, and shows generally in ordinary tides. From its north-east extreme, Cape Magoari can be seen from a vessel's masthead in clear weather. In the dry season the weather is often hazy.

The CENTRAL GROUP.—At about 2 miles north-west of the Braganza bank is that of Tijoca, lying N.N.E. and S.S.W. $5\frac{3}{4}$ miles in length, and $1\frac{1}{2}$ in breadth. It is composed of three hard sandy ridges, each about a mile in extent, and separated by channels having not less than $3\frac{1}{2}$ fathoms water. The northern ridge, called the Cabeza do Norte, lies N.N.W. $\frac{1}{4}$ W. distant about 11 miles from Tijoca point, and has $7\frac{1}{2}$ feet over it at low water. The Cabeza do Meio, or second ridge, is S.S.W. $1\frac{3}{4}$ miles from the former, and has about $1\frac{1}{2}$ fathoms on it.

The Cabeza do Sul is S.S.W., distant nearly $2\frac{3}{4}$ miles from the latter; N.W. $\frac{1}{4}$ W. about 9 miles from Tijoca point; N. $\frac{1}{4}$ W. from the opening between two small islets a little eastward of Taïpu point; and W.N.W. $2\frac{1}{2}$ miles from the south-west end of the Braganza bank. It is said that there are only $6\frac{1}{2}$ feet on this ridge at low water. They are steep to all round, and the channel between them and the Braganza shoal carries from $5\frac{1}{2}$ to 14 fathoms water. With any sea, there is a strong ripple on these banks appearing like breakers, which indicates their position; but this does not always occur.

The San João bank extends about W.S.W. and E.N.E. for about $3\frac{1}{4}$ miles. Its east end from a depth of $4\frac{1}{2}$ fathoms lies W.N.W., distant nearly 8 miles from the south-west end of the Braganza. The west end has $3\frac{1}{2}$ fathoms water over it; and the bank has from 5 to 8 fathoms round it, and 7 to 9 fathoms between it and the Braganza bank.

The Adonis banks are two dangers about $5\frac{1}{2}$ miles northward of that of San João, and are separated from each other by a narrow channel having 7 fathoms water. The eastern bank is about $1\frac{1}{4}$ miles in length east and west, with from $2\frac{3}{4}$ to $4\frac{1}{2}$ fathoms water on it. The western shoal is about $1\frac{3}{4}$ miles in length north and south, and has from $2\frac{1}{4}$ to $3\frac{1}{2}$ fathoms over it. There are from 7 to 9 fathoms water between these and the Magoari bank at about 2 miles westward, and $5\frac{1}{2}$ to 12 fathoms between them and the Cabeza do Norte at 7 miles eastward.

The Monjui bank lies about N.E. by E. $\frac{1}{2}$ E., distant 3 miles, from the east end of the Adonis. It extends E.N.E. and W.S.W., about 5 miles in length, and at its west end rather more than one mile in breadth, from which it diminishes eastward. There are from $2\frac{1}{2}$ to 5 fathoms water over it.

The CHANNELS.—The Braganza bank is separated from that of Tijoca by a passage about 2 miles in breadth, carrying from 7 to

15 fathoms water, over fine gray sand, called the channel de Dentro. It is always used for entering the river, and notwithstanding the limited space for working to windward, by vessels of more than 15 feet draught in leaving. The passage between the Tijoca and the Magoari banks is called the north or Monjui channel, and is generally preferred for vessels under 15 feet draught in leaving.

DIRECTIONS for the Channel de DENTRO.—Having embarked the pilot, steer to the north-west until in $10\frac{1}{2}$ fathoms water, and then W. $\frac{1}{2}$ N. along the coast in from $10\frac{1}{2}$ to 14 fathoms water, making due allowance for the tide, and passing 5 miles north of Cajetuba point. When on the meridian of Curuza point the breakers on the Braganza bank will be seen bearing about W. by S., distant 7 miles. Bearings now taken of the east extreme of Cajetuba, and the west part of Tijoca point to the south-west, will fix the vessel's position, and show the effect of the tide, for which on the flood a point to the north should be steered.

If the vessel's position is satisfactory, the course W. $\frac{1}{2}$ N. may be continued to be made good, in not less than 8 fathoms water, which will be found north-eastward of the flat extending E.N.E. from the Braganza, and which will increase to 10 fathoms north of it. When Tijoca point bears S. $\frac{1}{4}$ E., steer to the south-westward round the breakers, in from 12 to 15 fathoms, leaving them a mile to the eastward, until the Espadon, the southern breaker, is on with Tijoca point bearing S.E. $\frac{1}{4}$ S.; then steer S.W. $\frac{1}{2}$ S., which will carry a vessel westward of the Coroa Nova and all dangers. The soundings will decrease in the river to the south-westward to 6 or 7 fathoms.

If the breakers on the Braganza bank are not seen in consequence of a calm, high water, or the sun being too low in the horizon,* then from a depth of 13 fathoms at 8 miles north of Curuça point, the position having been fixed by cross bearings, steer W. $\frac{1}{2}$ N., when the soundings will decrease to 10 and 9 fathoms and again increase to 13 fathoms. If, with Tijoca point bearing about S. by W. $\frac{1}{2}$ W., the soundings decrease to 8 fathoms, the vessel will be too close to the ridge extending to the north-east from the Braganza, and she should edge to the northward until the point bears S. by E.

Then steer S.S.W. $\frac{3}{4}$ W. with the ebb, and S.S.W. $\frac{1}{4}$ W. with the flood, through the channel de Dentro in $11\frac{1}{2}$ to 13 fathoms water, until Tijoca point bears S.E. $\frac{1}{4}$ S., when steer S.W. $\frac{1}{4}$ S. as before. But if the vessel should be in less than 9 fathoms, the land of Tijoca being distant, and the islets of Rasa and Ratos out of sight, the vessel will be too far westward, near the Tijoca bank, and a more southerly course should be taken until Tijoca

* In this latter case, the coloured glasses of a sextant may be used to distinguish the breakers.

point bears eastward of S.E. $\frac{1}{4}$ S. If the islets are well open, bearing westward of South, with the land of Tijoca very distinct, and the depth decreasing, a vessel will be too near the edge of the Braganza bank, and should steer more to the westward.

These latter directions will prove useful in case the breakers on the Braganza do not show, which is seldom, or when the pilots, which is too often the case, are ignorant and incapable.* It would not be prudent for a vessel to enter this channel during night or in a calm. It would be better to anchor before reaching it, even at the risk of losing an anchor. The bottom is everywhere fine gray sand. Directions for the river are at page 271.

TIDES.—It is high water in the channel de Dentro, full and change, at 10 h. 51 m.; at the west end of the channel the rise is 10 feet. The flood sets to the S.W. $2\frac{1}{2}$ miles an hour, but at the highest springs $3\frac{1}{2}$ miles an hour; the ebb sets to the N.E. at the same rate.

CAUTION.—It is stated that, in anchoring on the coast of Pará and in the river, the anchors sometimes break on the bottom without any apparent cause, and it is recommended, even in calm weather, to let go the anchor with care, if possible to ease it down and not to check the vessel suddenly. Vessels should therefore be provided with good anchors and chains.

The CHANNEL Dos POZO.—If from any cause a vessel should be in the Pozo channel, between the Braganza bank and Curuza and Tijoca points, with a flood tide, it is most likely she will be nearer the Braganza than the land, which must be decided quickly by bearings. Then close the coast, where there is less depth, the tide not so strong, and the sea smoother than farther out; it can be approached without danger until in $7\frac{1}{2}$ fathoms water, then anchor with Tijoca point bearing S.E. $\frac{1}{4}$ S., distant 2 miles.

Here wait for the ebb tide until the next day, if the next ebb tide occurs after 3 p.m., so as to have the sun at a less angle than 45° . A vessel, however, wishing to proceed round eastward of the Braganza into the channel de Dentro, may work out of the Pozo, with the ebb tide immediately following, getting under way at high water, slack. The western part of Tijoca point, bearing about S.S.W., leads over the eastern part of the flat extending from the Braganza in about $3\frac{1}{2}$ fathoms water.

But in proceeding to the westward through the Pozo channel, a vessel should be under way at high water slack, and with Tijoca point bearing S.E. $\frac{1}{4}$ S., steer N.W. $\frac{1}{4}$ N., edging northward or southward so as to pre-

* The guards at the lighthouse are supposed to repeat to the pilots at Salinas the signals made by vessels; but no dependence whatever can be placed on them, as during the day they are invariably absent from their posts, fishing or shooting; the delay, consequently, is so great, that many vessels run up to Pará without a pilot, American vessels invariably do so. Mr. Vredenburg, British Consul at Pará, 1858.

serve the bearing of the point, but it is better to keep rather to the northward. The breakers on the Espadon, the south-west end of the Braganza, will soon be seen, particularly with the ebb, which pass at the distance of a long half mile.

When the breakers bear North, steer W.S.W., and when Taïpu point bears S. $\frac{1}{4}$ W., a vessel will be in the fair way of the river. In the Pozo the flood tide sets to the S.W., $2\frac{1}{2}$ miles an hour, and $3\frac{1}{2}$ to 4 miles during springs; the ebb sets to the N.E. at the same rate. This channel should only be used with a fresh breeze and settled weather.

THE COAST.—Between Tijoca point and that of Tapari, at about $6\frac{1}{2}$ miles to the south-west, the coast forming a bay is cut by several rivers or channels which divide the land into numerous islands. Tapari point is remarkable by three large trees which overtop the surrounding vegetation, and appear like hummocks. It may be said to form, with that of Taïpu point to the south-west, the estuary of the river San Gaëtano, where many secondary rivers also empty themselves. The Coroa Gaëtano extends as far as Taïpu point, covering the estuary of the river where close to the entrance are two islets named Rasa and Ratos, which serve as a mark for the Cabeza do Sul.

The land about Taïpu point is seen northward of the Braganza breakers, appearing like a low island, but on a nearer approach like two elevated hills, and joining the land to the south-south-west. Southward of these hills is a large tree, resembling a tower, near the north point of the mouth of the Fouro de Baretá. This tree is a good mark for the Viga river, which is also easily known by its abrupt point appearing detached.

THE COROA DO CORREIO, a bank of hard sand, is dry in places during spring tides, and on which occasionally the sea breaks heavily. It extends along the coast, from which it is separated by a narrow channel about half a mile wide, from northward of the large tree just mentioned, to the south-east of Carmo point. To clear it, keep Carmo point eastward of South.

THE VIGIA CHANNEL, formed by the island of Colares, is almost closed at the north entrance by the Coroa do Correio, which narrows its breadth to about 2 cables. The least depth through the channel is about 3 feet at low water, and in places there are 5 and 6 fathoms. The village of Vigia stands on the east side of the channel at about 3 miles within the entrance.

COLARES ISLAND is about $13\frac{1}{2}$ miles in length, $7\frac{1}{2}$ in breadth, and separated from the main by the above channel. It is more elevated than the land which precedes it to the north. Carmo point, the north-west extreme, appears perpendicular, caused by the trees on it, which have their roots in the water. At $6\frac{1}{2}$ miles southward of it is the village of

Colares, standing upon a flat sandy shore, sheltered from the sea by a ridge of rocks, uncovered at half tide, and which form a causeway for a distance of $1\frac{1}{2}$ miles from the shore. At $5\frac{1}{2}$ miles southward of the village is Cocal point, where the shore turns abruptly to the eastward. This part of the coast is skirted by several ridges of rocks.

BAY do SUL.—Cocal point forms the north extremity of a large and deep bay, called the bay do Sul, which is joined on the north by the Vigia channel, and on the south by the river San Antonio. It is partly filled by a large ridge of sand, which is dry in places, and extends from the distance of about half a mile southward of Cocal point to within half a mile of the south shore of the bay. When the parallel of the village of Colares is passed the south coast of the bay do Sul is seen, which terminates on the west by Marau point.

POMBAS ISLE.—At about $5\frac{1}{2}$ miles south-west from Cocal point, and close to the shore forming the south side of entrance to the bay do Sul, is Pombas isle, round, woody, and at first appearing attached to the mainland. A ridge of rocks extends to the northward from the isle for the distance of nearly a mile, and along the shore to the eastward, leaving between them and the ridge of sand extending from Cocal point, a narrow channel into the bay. The sea is here sometimes very high, especially with the flood tide.

MARAJÓ COAST.—The western shore of the river Pará from Cape Magoari, in the island of Marajo, runs almost south as far as the parallel of Carmo point. It is low, woody, and intersected by the mouths of several rivers, the principal of which is the Igarapé Grande, which is about a mile wide, and considered to be navigable for a great distance. Almost all these rivers communicate either directly or indirectly with the lakes in the interior of the island, and the greater part are navigable for small vessels. At $1\frac{1}{2}$ miles southward of the parallel of Carmo point is the village of Joannes, where the coast trends to the south-south-west. At nearly 5 miles southward of Joannes is the village of Monsarras; and at 5 miles farther on, close to the coast, and on the parallel of Cocal point, is the low islet of Coroa.

COROA MORISOCA.—From the Coroa Kiriri, page 261, the great bank bordering the shore of Marajo island trends to the southward for about 25 miles, where it is broken at 4 miles from the shore. This part of the bank, called the Morisoca, is dry in places, forming shallow uncertain channels, through which the boats of the country pass. Between its southern part and the Igarapé Grande there are 13 fathoms water.

COROA SECCA.—At the distance of 6 miles southward of the Coroa Morisoca is the north end of the Coroa Secca, which extends to the south-

ward for a distance of 5 miles, and is 2 miles in breadth. Its eastern edge is 7 miles from the coast of Marajo, and nearly midway between the two shores of the river; it will be known by the breakers. The channel between these two banks is deep, having in the southern part 12 and 14 fathoms water, but in the northern part from 3 to 5 fathoms only. This channel is frequented by boats visiting the west coast of Marajo.

COROA GRANDE.—This sand bank is partly uncovered, and, at a distance of $2\frac{1}{2}$ miles southward of Coroa isle, curves to the north-eastward as far as $6\frac{1}{2}$ miles from the coast, then trends north westward, leaving between its east end and the south extremity of Coroa Secca, north-east of it, a deep channel nearly 2 miles in breadth. These two latter banks are steep-to. Thus it has been shown that the coast of Marajo from Cape Magoari to the southward of Coroa isle, for a distance of more than 50 miles, is bordered by a line of banks, with passages between them. These banks are separated from the coast by large and deep channels.

The COAST.—Resuming the description of the coast on the eastern side of the river :—At the distance of half a mile from Marau point is the islet of Guaribas, low, and covered with brushwood. It is steep-to, with a clear narrow channel between it and the main. The coast from Marau point runs to the south-west, and at the distance of about $4\frac{1}{2}$ miles is Chapeo Virado point, where it trends to the southward for 3 miles to Musqueiro point, and then E.S.E., forming, with Barreiras island to the south, San Antonio bay.

Between Marau and Chapeo Virado points, at a mile from the shore, there are several ledges of rocks which are covered at high tide, with shallow water extending westward to the meridian of Chapeo Virado. These rocks are dangerous, and should be carefully avoided.

The CHANNEL to PARA.—The entrance of the navigable channel leading to the town of Pará is about $1\frac{1}{2}$ miles in breadth. At the distance of nearly 3 miles S.W. by W. from Musqueiro point, and fronting San Antonio bay, is the little woody islet of Tatuoca, rocky on the north side and sandy on its south. It lies on the west side of entrance, and is the northernmost of a group of islands running along the coast of the mainland over a distance of about 20 miles, and which bounds the western side of the channel. From the islet a ledge of rocks extends to the northward to the distance of $1\frac{1}{4}$ miles, which uncover at low water.

At about three-quarters of a mile southward of the islet is the extreme of a hard sand-bank, which extends $1\frac{1}{2}$ miles northward from Jetuba island, and dries at low water springs. At about half a mile westward of Musqueiro point, the north extreme of San Antonio bay, is a shoal with only $1\frac{1}{2}$ fathoms water on it. From the point a bank of sand extends to the southward to the south end of Barreiras island, which is separated

from Pinheiro point by the Magoari river. From the latter point the coast runs to the southward as far as the town of Pará. At the distance of 2 cables W.S.W. from the chapel on Pinheiro point, is a rock with 11 feet on it at low water.

The navigable part of the channel is contracted by Nova island and the mud banks extending north and south of it on the west; and by the banks which more or less border the shore at a short distance on the east. At rather more than three-quarters of a mile south-east of the island is the isolated and circular fort da Barra, nearly 2 cables from the shore; and about a quarter of a mile north of it is a sunken rock, with only one fathom water on it, which requires attention in passing. The bank extends north from Nova island for a distance of 3 miles.

Southward of fort da Barra the channel appears to widen, and here, at a distance of 2 miles from the mainland, the Onças island extends to the southward past the town of Pará, and covers the mouth of the river Guama. The space between the island and the main is divided into two channels by a long narrow bank of mud, which runs to the southward from Nova island past the town of Pará. This bank has from about 3 to 12 feet water over it. The coast of the mainland continues to be bordered more or less by a bank. The least depth in the navigable channel to the town is 3 fathoms.

Being southward of Pinheiro point, the towers of the principal churches of the town are seen, and soon after the other buildings. The anchorage is in front of the town, between it and the bank, and for a vessel of war a good berth will be found abreast the principal landing place, and clear of the merchant vessels, with fort da Barra N. $\frac{3}{4}$ E., cathedral S. by E. $\frac{1}{4}$ E., church turret about the centre of the city, E. by S., in 6 fathoms water, mud.

PARÁ, or Santa Maria de Belem, the capital of the province of Grand Pará, was founded in 1615, and stands on an elevated point of land on the right bank of the estuary of Pará or east arm of the Amazons, at about 70 miles from its entrance. The city is regularly built, and well lighted; the majority of the streets are macadamized with a description of ferruginous sandstone, which is easily crushed, and forms a hard concrete; they are tolerably drained, and kept in good repair. The houses, with their whitened walls and red tiled roofs, are substantially, and some even elegantly built of stone; few however have more than two storeys, and many of them only one.

There are public squares, a palace for the President, a handsome cathedral, which was commenced building in 1720, and said to be the largest in the empire, several churches, numerous convents, primary schools, an hospital, marine and military arsenals, theatre, botanic garden, &c. Pará

fronts the river, and in its rear there is a beautiful shaded walk. The Estrada das Mongubeiras (the Monguba road) about a mile long, extends from near the naval arsenal, on the river side, to the Largo da Polvora at the eastern extremity of the city. It is a magnificent avenue of silk-cotton trees (*Bombax monguba* and *B. ceiba*), huge trees whose trunks taper rapidly from the ground upwards, and whose flowers before opening look like red balls studding the branches; and it is intersected by avenues leading from the Palace-yard and the Largo do Quartel.

The naval arsenal is kept in good order, and at present appears to be only used for the small squadron employed on the Amazons. Frigates have been built here; wood material is plentiful, and of the best description. At the river Una, 2 miles north of the town, there is a convenient place for heaving a vessel down.

In the immediate vicinity of this road is the old convent, now hospital of San Jozé, and near by it the recolhimento of orphan girls. Beyond the actual precincts of the city a dense forest commences. The climate of Pará, though hot and liable to thunder-storms and heavy rains, is healthy for Europeans. The mornings are very delightful, and the time for exercise. The ground is of a sandy porous nature, and soon dries after the heavy rains. The population in 1858 amounted to about 22,000 souls, of whom about 5,000 were slaves. A large proportion of the population is composed of Portuguese, and there are a few English, Germans, and Americans. The native population consists principally of Tapuias or Indians, and mixed races. The interior of the province may be considered as inhabited entirely by Indians.

The communication between Pará and the other ports of the empire is kept up by fortnightly steamers belonging to a company at Rio de Janeiro, which receive a large subvention from the government. Another company is established for the purpose of navigating the river Amazons. The principal station is Pará. This company owns six steamers, two of which are of large size; they perform two voyages a month, as far as Manaus, the capital of the province of Alta Amazons. At that town, cargo and passengers for places higher up are trans-shipped to smaller boats, which go as far as Nanta in Peru.

The round voyage is performed in about two months. Another boat makes bi-monthly voyages to Cametá, a town of considerable commercial importance on the river Tocantins. These steamers, with numerous small craft and canoes that navigate the various rivers, may be considered the only means of communicating with the interior; for although there are tracks leading into the forest from the different towns and villages, there is not a road in the province properly so called.

The following are the principal towns in the province of Pará, with the articles of commerce which are forwarded thence to the capital for shipment :—

Cametá.—Tapioca, india-rubber, Brazil nuts, and cacao. Gurupa.—India-rubber, Brazil nuts, cacao, sarsaparilla, and tonquin beans. Obidos.—Cacao, hides, tonquin beans, balsam of copaiba, and puxiri. Breves.—India-rubber. Braganza.—Cotton, balsam of copaiba, hides, tonquin beans, and copal varnish. Santerem.—Cacao, sarsaparilla, Brazil nuts, and balsam of copaiba. Porto do Moz.—India-rubber. In 1857, 98 vessels, amounting to 25,316 tons, entered inwards; and 99 vessels, equal to 25,135 tons, cleared outwards. In the same year, the value of the imports amounted to 3,616,720 milreis; and that of the exports to 4,056,538 milreis.*

Caution.—It is advisable to take some precaution against rats getting on board a vessel, for the river is infested with them.

Supplies.—The water of the river is good during a part of the year, but unwholesome and dangerous to drink in the months of July, August, and September; it can then be obtained from a well, convenient to the beach at Pinheiro point, or by digging wells at half-tide on the flat beach of San Antonio bay, which are destroyed the next tide. When taken from alongside it soon settles, leaving two or three inches of sediment in each tank. Fresh beef, vegetables, and good biscuit may be obtained here but it is seldom provisions for sea service can be procured. The port offers but little maritime resources, and no vessel meeting with an accident should, if avoidable, go to Pará, as the common articles of ship chandlery are barely procurable. The mariner should therefore reckon with great reserve on this port for supplies of any kind.†

TIDES.—It is high water at the custom-house quay, Pará, full and change, at 11 h. 40 m.; at the anchorage, 12 h.; and at Onças island, at 1 h. 20 m.: springs rise $12\frac{1}{2}$ feet, and neaps 8 feet. The flood tide runs at the rate of about $2\frac{3}{4}$ miles an hour, and $3\frac{1}{2}$ miles during springs; that of the ebb $2\frac{1}{2}$ miles, and $3\frac{1}{4}$ at springs. In winter, whilst the winds blow from the north, the flood lasts longer than the ebb, and runs with greater strength; but during the rest of the year the ebb tide lasts longer, and is more rapid than the flood.

The difference of level is caused by the influence of the waters of the Guama and Guajara. The time of high water in the Guama is much later than that of the Guajara, rising in the former while it is falling in the latter. When the flood has made at Pará, the ebb is still falling in the Guama. The time of high water, and the strength of the tide, however, vary according to the force and direction of the wind, and the quantity of rain that falls in the upper part of the rivers.

* The value of the milrei is about 2s. 3½d.

† In 1856, Commander H. V. Haggard, of H.M.S. *Virago*, says, "Supplies of all sorts, except fresh beef, were very expensive, and indeed sometimes not to be procured for any money; good water was brought to the wharves in carts and conducted into the paddle box boats at the rate of 1,600 reis per ton."

WINDS.—In the summer the mornings are generally calm, or a light breeze blows from East to E.N.E., and by degrees veers to the northward; in the afternoon it blows from N.E. to N.N.E., and often fresh until 5 or 6 p.m.; it then falls calm, which lasts till the morning. In winter the breezes are irregular, and during the rainy season there are light squalls and calms. These squalls are variable, blowing from north to south. When at this season the regular breezes set in for a time, the weather improves also, and is fine during their continuance. The temperature varies between 70° and 90° Fahrenheit; it rarely descends lower or rises higher than these two limits. Probably there are few places where so much rain falls annually as at this town.

DIRECTIONS for the RIVER.—When the Espadon, the south-west end of the Braganza bank, is on with Tijoca point bearing S.E. $\frac{1}{4}$ S., steer S.W. $\frac{1}{4}$ S., in 12 to 6 fathoms water, until Como point bears East, distance $4\frac{1}{2}$ miles; then the course will be S.S.W. $\frac{3}{4}$ W. as far as the parallel of Cocal point, from whence steer so as to pass $1\frac{1}{2}$ miles westward of Guaribas islet. If the soundings, before reaching Pombas islet, exceed 8 fathoms, the vessel will be too far westward, and she should keep more to the southward, to avoid the Coroa Morisoca and Coroa Secca. In the route southward, between Pombas and Guaribas islets, there are 9 and 11 fathoms water; between the latter islet and Chapeo Virado point 13 to 16 fathoms over rocky bottom; and from thence to Musqueiro point 9 and 11 fathoms.*

Do not bring Guaribas islet to bear northward of N.E. by E. $\frac{1}{4}$ E. until Musqueiro point bears S. by E. $\frac{1}{4}$ E., when the reef extending from the shore northward of Chapeo Virado point will have been passed. Then steer so as to give Musqueiro point a berth of a long mile, passing eastward of Tatuoca isle and the shoals north of it, and then for Pinheiro point, which will be seen to the south, making allowance for the wind and the flood tide which sets to the south-west towards the islands. Having passed Pinheiro point at the distance of half a mile, so as to avoid the rock lying W.S.W. 2 cables from it, keep along the coast for the passage between Nova island and fort da Barra.

When the north part of Arapiranga island is seen through the opening between Mirim and the island south of it, a vessel will be approaching the extremity of the bank extending north from Nova island, then steer so as to pass a little westward of fort da Barra, avoiding the rock a cable's length north of it. From fort da Barra steer towards the town, but do not pass inside the line of the fort and cathedral, on account of two banks said to lie abreast Val de Caens. If the wind is light, care must be taken

* See Plan :—Channel to Para, on Sheet, No. 2,186.

to guard against the flood tide, which sets strong to S.W. between the Una river and the point of the town.

The mark for being near the edge of the bank extending from Fortin island to the anchorage, is the west angle of the hospital, a white house standing in the west part of the town, on with the church of Carmes, in the south-west part of the town. The anchorage is in $3\frac{1}{2}$ fathoms water, between the church of San Antonio, at the north end of the town, and that of Merces, standing in the centre.

DIRECTIONS for leaving the RIVER.—Vessels leaving the anchorage of Pará should be under way at high water, and stand to the westward into $4\frac{1}{2}$ fathoms water, or until the hospital and church of Carmes are in line, if of large draught, but into $3\frac{1}{2}$ fathoms if of light draught; and to the eastward to a line between the cathedral and fort da Barra. When the north part of Arapiranga island is seen between Mirim and the island southward of it, a vessel will be northward of the bank extending north from Nova island, and may stand towards the islands into $4\frac{1}{2}$ or 5 fathoms.

A vessel will thus probably arrive as far as Musqueiro point before the flood makes, and if the parallel of Pombas islet can also be reached, proceed on; but if not, it will be better to anchor southward of the point, to prevent doing so farther north in deep water, rocky bottom, and in the full strength of the flood tide. At night proceed with caution between Musqueiro shore and Tatuoca islet and the rocky bank extending north of it, which is steep-to. When north of the parallel of Musqueiro point, a vessel may stand across to the westward during the day, whilst southward of Marau point, till on the meridian of the west part of Contejuva island.

The depths will be from $10\frac{1}{2}$ to 15 fathoms, and, when they decrease to 11 fathoms, tack, and stand eastward into 9 fathoms. The lead is not a guide when standing towards the Coroa Grande or Coroa Secca, as the water is deep, and the banks are steep-to; between the parallels of Marau and Cocal points, vessels should not stand westward of the meridian of Chapeo Virado point; and when north of Cocal point, tack short of the meridian of Marau point. In standing to the eastward the lead will be a sufficient guide, tacking at a prudent distance from the shore. The seaman should bear in mind that the tide is weaker near the shore, which should be avoided in working down, but where they should anchor, in order to avoid the strength of the flood tide and the sea, which is felt in the stream of the channel.

The second ebb tide will probably take the vessel between Colares and Carmo point. The best place to anchor, if possible, is westward of Cocal point, in 5 or 6 fathoms water, or between Carmo point and the ledge of rocks extending northward from Colares in a convenient depth, muddy bottom. The third ebb tide will probably carry a vessel to about 4 miles

N.N.W. $\frac{3}{4}$ W. of Taipu point; stand westward to a prudent distance, and eastward into not less than 5 fathoms; but tack short of the meridian of Carmo point, until well northward of the Correio bank.

To sail out by the **CHANNEL de DENTRO**, it is necessary to have daylight, and to be under way at high water. A vessel should stand to the north-west, but not to lose sight of the land of Tijoca. In standing eastward, whilst Tijoca point bears northward of E. by S. $\frac{1}{4}$ S., keep Taipu point eastward of South, or do not open of each other the two small islets of Rasa and Ratos. In the second board to the north-west the vessel should not pass northward of Espadon breakers or bring Tijoca point to bear southward of S.E. by E. $\frac{1}{4}$ E. In the second board to the eastward, the vessel will most likely pass northward of the north extreme of the Coroa Nova, and may stand on as far as the meridian of Rasa and Ratos islets. In the third tack to the north-west stand into 7 fathoms water, with Espadon bearing E. $\frac{1}{4}$ S.

Short tacks should now be made through the channel de Dentro, standing towards Tijoca bank into 7 fathoms, and to the Braganza bank to about the distance of half a mile from the breakers. The most dangerous part of this passage is the Cabeza do Sul, page 262. It often happens that a vessel does not get through in one tide; in this case anchor in 7 or 8 fathoms water on the west side of the channel. Care must be taken not to stand too near the north-east extreme of the Braganza; the soundings in the stream of the channel will be from 12 to 15 fathoms.

When approaching the meridian of Curuza point, avoid the $3\frac{1}{2}$ -fathom patch, which lies N. $\frac{3}{4}$ W. distant $14\frac{1}{2}$ miles from that point, and N. by E. from that of Tijoca.

CHANNEL de POZO.—A sailing vessel can also leave by the channel de Pozo, if the wind will admit of her laying up S.E. Having brought Tijoca point in line with the Espadon breakers bearing S.E. $\frac{1}{4}$ S., steer so as to skirt the south-west part of the Braganza bank, and work to windward, keeping on the east side of the channel. This channel is shorter and easier than that of the Dentro, and is very convenient for a steam vessel, when bound eastward.

The **NORTH or MONJUI CHANNEL** is chosen by vessels drawing less than 15 feet; the only danger for those of about that draught being the Adonis banks, at the west side of the channel. On leaving the anchorage at about 4 miles N.W. by N. of Taipu point, at high water, steer N. $\frac{3}{4}$ W., which, with the ebb tide running N.E. at 2 miles an hour, will make good about a North course. Having lost sight of land and the soundings decrease from 5 and 8 fathoms to $3\frac{1}{2}$ fathoms, a vessel will be on the Monjui bank, when she should steer more to the westward till the water again deepens.

If the wind does not admit of the vessel heading N. $\frac{3}{4}$ W., on leaving the anchorage north-west of Taipu point, she may pass over the San João banks, where there are not less than $3\frac{1}{2}$ fathoms at low water, and therefore at nearly high water not dangerous. A vessel navigating this part of the entrance to the Pará with a strong working wind, cannot be guided by any positive marks, being out of sight of land, and the soundings not indicating the approach to the banks.

By keeping on the east side of the channel, but not eastward of the west part of Taipu point, bearing S. $\frac{3}{4}$ W., a vessel will be clear of danger. With Cape Magoari in sight from the masthead, and if in $2\frac{1}{2}$ fathoms water, a vessel will be on the Adonis bank, and should make a short tack to the eastward; and if the cape is sighted from the deck when in $5\frac{1}{2}$ fathoms the vessel will be too far westward. As a rule, when the cape is distinctly seen from the deck, a vessel will be too near the Magoari or Santa Rosa banks.

The soundings over the Monjui bank will indicate the vessel's position; and after passing it, the bottom, which has hitherto been of gray sand, is soft mud. If there is but little wind, and the ebb tide nearly done, it will be prudent to anchor on this muddy bottom, to prevent being carried westward by the flood; but with a fresh breeze stand to the northward, unless the soundings decrease to less than 7 fathoms.

ROUTE to the EASTWARD.—The general route to the eastward is close in shore out of the influence of the westerly current (*see* page 259), and by taking advantage of the tide, and every slant of wind, a sailing vessel will generally perform the voyage from Pará to Pernambuco in about 30 days. When the weather will admit a vessel may anchor in any part of the coast without danger. In working along shore the dry season is considered preferable, as the winds are then fresh and steady. Stand off during the day, and in towards the land at night, so as to be near the coast in the morning to take advantage of the land wind, by which a good sailing vessel will make from 40 to 50 miles a day.

In the rainy season working to windward is more tedious, as calms, light variable winds, squalls, and rain prevail; a vessel should then stand on that tack the most favourable, and as a general rule should not go outside 30 fathoms water, and in towards the land to a prudent distance. From Pará eastward as far as the Pernaibão or Peranahiba there are numerous rivers along the coast, and in getting in with the land attention should be paid to their streams. Should the wind be steady tack as in the dry season, but do not lose sight of the coast.

Having arrived so far eastward as Mel point, and failing to get farther to windward, a large vessel should stand direct to the northward for about 180 miles or until well able to weather the north-east extreme of the

continent on the port tack.* A small vessel may go inside the shoals of San Roque, where she may anchor at night, and although there is not room to work through Santo Alberto channel, the water is smooth, and advantage may be taken of the land wind in the morning. No difficulty will be experienced in obtaining a pilot, in the vicinity of cape San Roque or the villages westward, for the inshore channels.

Should, however, the mariner prefer standing direct to the northward from Pará across the equator into about $10^{\circ} 15' N.$, and then tack, he will save wear of men, sails, and rigging, and will probably perform the voyage to Pernambuco in about the same time. The Brazilian vessels generally take the inshore route.

* H.M. brigatine *Spy*, Lieut. T. B. Collinson, in the early part of April 1859, was 12 days trying to get 60 miles to windward when about that distance north-west of cape St. Roque. The vessel experienced during that time a current setting N. 84° W. true, 434 miles. See page 231.

CHAPTER VIII.

RIVER PARA TO THE RIVER MARONI IN FRENCH GUAYANA.

VARIATION from $1^{\circ} 30'$ West to $1^{\circ} 0'$ East, in 1864.

THE AMAZONS or MARAÑON is the largest river in the world. Its proper and most remote source is the Ucayale, a branch of which rises near La Paz, in lat. 18° S. The Marañon, a more northern branch, rises in a lake north-eastward of Lima, and, after a course of many miles to the north, is joined by the Chinchipe at Jaen. From this point, which is only about 200 miles from the Pacific ocean, the river is navigable to its mouths, a distance of 2,100 miles in a direct line, or 3,000 miles by the course of the stream. The height of the river here is 1,240 feet, and hence it appears that the fall in its bed is on an average about five inches per mile, but it is of course greater in the upper than in the lower part of the stream.

At some distance below Jaen the breadth of the river is about 290 yards, and the depth 30 fathoms. The Marañon is joined by the Ucayale in long. 73° W., by the Napo at $71\frac{1}{2}^{\circ}$, and by the Japura at 65° W. The other most considerable branches are the Negro on the north, and the Juruary, the Madeira, and the Tapajos on the south. Many of the tributaries of the Amazons greatly surpass in size the Rhine or the Danube; and their number is very great. It flows through 22° of longitude, near the equator. The country watered by the river and all its branches, embraces an area of about 2,100,000 English square miles.

At a pass called the Pongo, about 140 miles below Jaen, the bed of the stream is suddenly contracted from 500 to 50 yards, the Amazons having here cut its way through the rocks, which rise like perpendicular walls to a great height. At the junction with the Napo, in long. $71\frac{1}{2}^{\circ}$, its breadth is 1,800 yards, and its depth more than 100 fathoms. Between the Negro and the Madeira its breadth is about 3 miles, which extends for 6 miles where there are islands; but during the annual rise of the water it covers a great part of the adjoining country, and has then no determinate limits.

At Pauxis, 600 miles from the sea, the tides are sensibly felt every ten hours; and it is inferred, from the time the rise of the waters requires to travel this distance, that there must be a succession of tides in the river at all times, and that its surface of course presents an undulating line. It has been computed that the water passes from Jaen to the sea in 45 days, at the rate of $66\frac{2}{3}$ miles per day, or $2\frac{2}{3}$ miles an hour. But the

influence of the tides is felt 400 miles from the embouchure. In the rainy season the stream runs at 4 miles an hour. The colour of the water is a yellowish clay tint. Some reckon the rio Tunguragua the source of the Marañon, which would give it a course of 3,300 English miles; but if we consider the rio Ucayale as its source, its course cannot be less than 3,700 English miles.

The Amazons traverses a region thickly covered with lofty forests, which are the haunts of the jaguar, bear, panther, and many other wild animals, and are inhabited by numerous small tribes of savages. The river abounds in fish, many of which are of the most delicious kinds; and turtles of an excellent quality are numerous. Large alligators are seen stretched motionless in the mud, like trunks of trees. Nearly all the branches of this noble stream are navigable to a great distance from their junction with the main stream; and, collectively, the whole afford an extent of water communication unparalleled in any other part of the globe. The wind and current are always opposed to each other, thus rendering the navigation easy. Its mouths, between Tijoca point and Cape Norte, extend over a space of 180 miles.

MARAJO ISLAND separates the rio Pará or south-east arm of entrance to the Amazons, from the main stream. It is low and flat, but it does not consist entirely of alluvium or river deposit, for in many parts the surface is rocky; it is mostly covered with brushwood and grass, but the whole of the southern and eastern parts is covered with forest. This luxuriant island supplies Pará with cattle and horses. In the rainy season it is much flooded, and is very unhealthy when the water leaves it and the sun begins to exhale the malaria, when remittent fevers prevail. The island is said to be overrun with alligators, snakes, and wild beasts.

FOURO de GOYABAL.—Between Carnapijo island with the Pará group northward of it, and the shore of Marajo island, is a wide and deep channel leading to the Fouro de Goyabal. The only dangers are the Boulonnaise, a rocky bank at less than 2 cables from the land at one mile westward of Capim island, on the south-east shore; the other a reef of rocks at about the distance of a mile eastward of the easternmost Goyabal island, but its exact position is uncertain; it will be avoided by keeping southward of the parallel of the island.

The islands of Goyabal, separated from the shore of Marajo by a narrow channel carrying from $5\frac{1}{2}$ to $13\frac{1}{2}$ fathoms water, called the Fouro de Goyabal, are connected together and to the main land by an extensive sand-bank, which also covers the mouth of the Tocantins, a river 1,600 miles in length, on the south-east. The navigation of the Fouro de Goyabal is difficult, in consequence of the strength of the current from the Tocantins river, and by the sea caused by the winds.

FOURO and VILLAGE dos BREVES.—Having passed through the Fouro de Goyabal, the channel westward is clear and deep. Between the Goyabal islands and Coralhino point, at about 25 miles westward, is the Paqueta island on the south, and the Carnaticu on the north, followed by the Coralhino group on the south. Care should be taken to avoid a rocky shoal lying about one mile southward of the village on Coralhino point. On both sides of the river are inlets cutting the coasts into numerous islands. The whole country on both sides is a forest.

From the latter point, to the entrance of the Fouro dos Breves at about 32 miles farther on, the channel continues deep; but between 4 and 5 miles westward of the point on the south side of the river, beyond that of Coralhino, a bank extends northward which will be avoided by keeping more than half channel to the northward. From the south point of entrance to the Breves, a bank stretches to the eastward, to a small islet at the distance of $6\frac{1}{2}$ miles; and the low islets on the north side of entrance are also fronted by a bank.

The Fouro dos Breves is a narrow channel separating Marajo island from the main, and sufficiently wide for any vessel with a fair wind. It runs to the north-westward for about 24 miles, carrying from $5\frac{1}{2}$ to 20 fathoms water, to a wide space called the Poço. At about 8 miles from its entrance on the shore of Marajo is the village of Breves, consisting of about forty houses.

FOURO ATURIA.—The Poço, or well, between the Fouro dos Breves and that of Aturia, is a space of about $4\frac{1}{2}$ miles in length and 2 in breadth, having from 11 to 14 fathoms water. In it are the openings of the Fouros dos Macacos and Jabura, on the north, which communicate with the Amazons above the Fouro Lemago; and of several others coming from the south. From the Poço the Fouro Aturia, with a mean breadth of not more than 55 yards, and carrying from $4\frac{1}{2}$ to 11 fathoms water, runs to the north-west for more than 55 miles, to San Salvador island on the north. Here the Fouro du Tojapuru, on the south, runs to the eastward; and at about 8 miles to the east is the mouth of the Lemao on the north; both are about half a mile in breadth, with $5\frac{1}{2}$ fathoms water. In the Tojapuru and Aturia the current runs constantly to the eastward, whilst the Jabura and Macacos are subject to the regular tides.

SAN SALVADOR and CUPURUHI ISLANDS.—From the west end of the Fouro Aturia, the channel, having from $13\frac{1}{2}$ to 27 fathoms water, trends to the south-west to the mouth of the rio Xingú, a distance of more than 40 miles, between San Salvador and Cupuruhi islands on the one side, and the main land on the other. The only dangers are a bank of mud extending from the south point of Cupuruhi; and a bank bordering the shore from the village of Gurupi to a distance of 4 miles eastward.

The small village of Gurupi stands on a rocky bank 30 or 40 feet high, on the main about $3\frac{1}{2}$ miles southward of the south point of Cupuruhi; and here another channel runs to the north-eastward, westward of the Cupuruhi and San Salvador islands; but it is not generally used. From the mouth of the Xingú, the first of the great tributaries of the Amazons, 1,200 miles in length, the river runs to the north-west into the main stream between Boulonnaise point and the south end of Gurupi island.

SERRA do PARU.—From the west point of Teurikaia island at the mouth of the fouro of the same name, the summit of the Serra do Paru is seen to the westward at the back of Comandahi island. The southern coast continues low, whilst at the mouth of the Fouro dos Arrayolos; on the north or left bank, the shore rises gradually till it joins the crest of the Serra do Paru, and has numerous objects and some remarkable summits, such as the Red peak, like an isolated cone of a bright reddish colour; the summit of Velha Pobre, a rocky hill nearly 984 feet high, rising almost vertically from the river; and Piton Carré, like a truncated cone, the upper part of which is level and parallel with the horizon.

NOVA GRANDE and NOVA PEQUENA ISLANDS.—On the east, at the foot of the Paru range, below a ruined fortification, is the little village of Almirim, consisting of only a few houses. At about 11 miles farther on is the small island of Nova Pequena, and 6 miles westward is Nova Grande, having a bank of sand and mud extending from its west end, and continuing along the coast so near as not to be dangerous. Both islands are on the southern shore, and separated from that of Velha Pobre on the north by a deep channel carrying from 8 to 11 fathoms water. The channel north of Velha Pobre is narrow, deep, and the stream runs strong. It is avoided by boats ascending the river, but is frequented by those descending.

PARACUARA ISLAND.—VILLAGE of PRAINHA.—From Velha Pobre island to that of Paracuara the river is wide, deep, and clear of danger, except the bank from the west end of Nova Grande; but it narrows at Paracuara island, the depth increases in places to 27 fathoms, and the current becomes very strong till the village of Prainha is passed, at about 40 miles westward of Velha Pobre, when the river begins to widen. From Paracuara island to Prainha are the Acarassu, Itanda, and the Uruara islands, the approaches to which are clear, but near them the current runs with so much strength that it is difficult to overcome it. From Prainha to Monte Alegre island the river is clear from one bank to the other, and runs to the W.S.W. with a wide and deep channel.

MONTE ALLEGRE ISLAND and VILLAGE.—The northern bank of the river is more elevated than that on the south, and has a small

The river is very deep and the water is very clear. The banks are very high and the vegetation is very dense. The river is very long and the water is very clear. The banks are very high and the vegetation is very dense. The river is very long and the water is very clear. The banks are very high and the vegetation is very dense.

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From Monte Allegre Island to the river is very deep and the water is very clear. The banks are very high and the vegetation is very dense. The river is very long and the water is very clear. The banks are very high and the vegetation is very dense. The river is very long and the water is very clear. The banks are very high and the vegetation is very dense.

The river is very deep and the water is very clear. The banks are very high and the vegetation is very dense. The river is very long and the water is very clear. The banks are very high and the vegetation is very dense. The river is very long and the water is very clear. The banks are very high and the vegetation is very dense.

In approaching its mouth, that of the Fouro Ituki will be seen on the south bank, and the mouth of the river Tapara, which leads to the lake of Monte Allegre, on the north, and the land just mentioned declines in height to the west.

SANTAREM is the only place above Macapá where any supplies can be obtained, which are very limited, and only for daily use. The population is about 3,000. The water of the Tapajoz at the commencement of the rainy season is impregnated with decayed vegetable matter from the inland lakes, unwholesome, and unfit to drink.

MARIMARITUBA ISLANDS.—Above the mouth of the Tapajoz the river runs north-north-west as far as the eastern mouth of the Fouro d'Alemquer; where it turns to the west and south-west as far as the south extreme of Marimarituba island, which is separated from the main land south of it, by the channel of Couipiranga; it then trends to the west-north-west as far as the west extreme of the Boulonnaise islands, at about 50 miles from the mouth of the Tapajoz. These islands are on the left bank and leave between them and the right bank, a deep narrow channel, in which the current acquires a force difficult to overcome.

BOULONNAISE ISLANDS.—LAGO GRANDE.—From the Boulonnaise islands to Obidos, the river runs to the north-west, becomes narrower, deeper, and the stream runs with greater rapidity. From Santarem to Obidos the banks are low, and in the rainy season almost completely under water. The south bank of the channel of Couipiranga alone has a steep shore which is from 150 to 165 feet high, bounding Lago Grande on the north-east, which extends from Villa Franca on the Tapajoz as far west as Obidos. Lago Grande communicates with the Tapajoz by a channel near Villa Franca, and with the river by several openings west of Couipiranga, and by one west of Obidos. It is full of fish, and said to be navigable in a great part of its extent.

OBIDOS.—The town of Obidos with about 1,300 inhabitants, about 500 miles by the course of the river from Pará, stands on a high bluff overlooking the river, and connected with a line of hills to the northward. It has a better supply of provisions than Santarem, but the great strength of the current and the depth of water, being from 40 to 53 fathoms, renders it an inconvenient place for remaining.

DIRECTIONS.—The uniform aspect of the banks of the Amazons, the resemblance between all the islands and the various points along its course, and the almost entire absence of objects of recognition, renders it impossible to give fixed direction for navigating this river. It will, therefore, be necessary to employ a pilot, not for avoiding the dangers, but to prevent mistaking one channel for another. The lead should be

kept going, and the main object is to avoid the great strength of the current. A small vessel leaving Pará can take the route southward of Marajo and pass through the Fouro de Goyabal, avoiding the rocky shoal westward of it.

From thence steer along the coast of Marajo, leaving Paqueta island on the port hand, and Carnaticu on the starboard hand, passing Coralinho point at the distance of $1\frac{1}{2}$ or 2 miles, or keep rather nearer the islands fronting it. Then continue along the coast of Marajo at the distance of $1\frac{1}{2}$ miles, and from the islands bordering it. After running about 18 miles to the westward of Coralinho point, the entrance to the Fouro dos Breves will soon be seen; then steer for and through it in the middle of the channel to the Poço.

In leaving the Poço a vessel can take the Jabura running to the northward, or the Aturia, which is the better channel, if the wind is strong enough to enable her to stem the current. In either case the vessel will arrive into the southern branch of the river, which follow, first approaching the shore of the islands fronting the Lemaó, then keep on the right bank of the river, where the currents are less strong, as far as Boulonnaise point, where the two arms of the Amazons meet.

In now entering the main branch of the river, a vessel should keep along the southern shore, as close as the soundings will admit, to avoid the great strength of the stream (and also a sand bank between 2 and 3 miles in extent, which commences off the mouth of the Fouro Teurikaia, at about 15 miles from the south point of Gurupa, and extends past a group of trees, which terminate the bare part of the land, called Campo Alegre, a little west of it), until about 4 miles from Nova Pequena island; then keep in the middle of the river and pass between that island and Velha-Pobre. Continue in the middle of the channel, passing westward of Nova Grande island, and then southward of Paracuara and Acaraassu islands, keeping close to the latter and gain the left bank of the river, which should be kept at a short distance to avoid the current, which is here very strong.

Having passed on either side of Monte Allegre island, steer along the left bank of the river until having rounded the bend of the shore abreast Barreiras island, when the right bank should be closed as far as the mouth of the Tapajoz. In entering the mouth of this river to anchor off Santarem, it will be necessary to avoid a mud bank extending eastward from Negra point; and after rounding the south point of entrance, a vessel should anchor south-west of a shoal, which is steep-to, extending off the west end of the town.

In proceeding up the Amazons from the Tapajoz a berth should be given to Negra point, and having rounded it, keep the right bank of the

river aboard as close as possible by the lead, until up to Abidos; when, if it is intended to anchor off that town, steer across the river. The great strength of the current throughout the channel of Obidos, with a depth of 40 to 53 fathoms, makes it necessary to anchor eastward of the steep rocky shore on which the town stands, at about a quarter of a cable's length from the river's bank, in 18 or 22 fathoms water, and to steady the vessel with a hawser fast to the shore. In ascending farther, the left bank of the river should now be kept aboard as far as the bend above Obidos.

In a large vessel the route round north of Marajo and through the north-west branch of the river should be taken.

THE MAIN ENTRANCE to the AMAZONS.—From Cape Magoari, the north-east extreme of Marajo island, the shore, which is intercepted by numerous rivulets, runs westward almost straight to San Joaquim point at its north-west end, a distance of more than 100 miles, where it trends to the S.S.W. The north edge of the Magoari or Santa Rosa bank, which extends 14 miles eastward of the cape, lies almost on its parallel, but its limit is yet uncertain, and it should not be approached.

The north coast of Marajo is said not to be dangerous, and it forms the south side of the main entrance to the Amazons. The north side of this entrance is bounded by Frescas, Mexiana, and Caviana islands, which are connected by an extensive bank, and which extends from the former island E.N.E. to a distance of about 12 miles, but its exact limit is yet uncertain. On a point of Marajo island, W.S.W. of the west extreme of Mexiana, is the village of Chaves, consisting of about 50 houses.

MEXADOS and NOVA ISLETS.—At 18 miles westward of Cape Magoari, and 2 miles from the shore of Marajo island, is the small low woody islet of Mexados. From it a shoal extends eastward towards Cape Magoari, and westward northward of the small low woody islet of Nova, lying south of Frescas, and from thence along the coast for a distance of 7 miles from it, where its edge trends to the south-west. Between Mexados islet and that of Nova, close to the shore, is the small group of the Bentivi and Navios islets.

FRESCAS ISLAND and JURUA BANK.—The low small island of Frescas lies about 34 miles westward of Cape Magoari and 3 miles northward of isle Nova. Formerly there existed westward of Frescas an islet called Jurua, which was carried away by the current, leaving a bank, which now extends from Frescas island to the south-east part of Mexiana, at about 22 miles westward. The shoalest part of the bank, about midway between the two islands, uncovers at low water, but its southern limit is uncertain.

MEXIANA and CAVIANA ISLANDS, forming with that of Frescas and the extensive bank running east and west of it, the northern boundary of the main entrance to the Amazons, are low, wooded, and in the rainy season their savannas, covered with water, extend over a space of more than 70 miles. The northern shores cannot be approached for a great distance, from the extensive shoals which border them. The low south shore of Mexiana island, forming a slight southerly curve, with the coast of Marajo south of it, to its extremity in about long. $49^{\circ} 48' W.$, is clear of danger with deep water all along close to the mangroves which cover it.

The south shore of Caviana island is also clear of danger with deep water, except a bank at the mouth of a river about 11 miles north-westward of Bossutuba point, its south-west extreme.

CAJETUBA and CAMELIONS ISLETS.—The Cajetuba islet lies off the coast of Marajo at 4 miles westward of the village of Chaves, and south of Caridade point, the south extreme of Caviana island. At 10 miles westward of Caridade point is the Camelions islet, with a bank fronting it on the north.

JURUPARI ISLAND and REMEDIOS ISLE.—At about 15 miles N.W. of San Joaquin point, is the north-east point of Jurupari island with Pacas island between. The north shore of Jurupari runs straight to the W.N.W. for a distance of nearly 14 miles. In the middle of the channel between its north-west end and the coast of Caviana is the Middle bank, with about one fathom water on it. At 18 miles nearly West of the north-west extreme of Jurupari is the small islet of Remedios, and from it a bank curves eastward nearly as far as Jurupari; the whole forming the southern boundary of this part of the main entrance to the Amazons.

DIRECTIONS.—A vessel from the eastward bound to the anchorage off the town of Macapá should make the land about Cape Magoari with caution, and not approach it nearer than $5\frac{1}{2}$ fathoms water; then run along the land to the westward in $5\frac{1}{2}$ to about 11 fathoms, passing north of Nova islet and southward of Frescas island. Then steer to the south-west, southward of the Jurua bank, towards a point which terminates abruptly, and remarkable by a small peak having the appearance of an island, on the coast of Marajo. From the point steer for and along the south shore of Mexiana island.

In the middle of the channel on about the parallel of the village of Chaves and S.S.E. of the west point of Mexiana, is a ridge of rocks; its exact position is doubtful, but it is avoided by keeping Mexiana aboard where the water is deep. At about 5 miles eastward of the west end of Mexiana is the little village of Nazareth, where a vessel may anchor.

From the west end of Mexiana, Caridade point, the south-east extreme of Caviana island is seen, which may be approached close, and the island should be kept aboard on account of the bank which fronts Camelions islet, at 10 miles westward of the point. Having reached Bossutuba point, it may be rounded close to in a depth of 32 fathoms, and the coast of Caviana island should then be kept aboard.

The bank at the mouth of the river, at 10 miles to the westward, will be avoided by keeping $2\frac{1}{2}$ miles from the shore, and by not going farther off a vessel will pass north of the Middle bank lying south of the west point of Caviana. When the meridian of this latter point is passed steer about W. $\frac{1}{4}$ S. for Pedrera point, which will soon be seen, and then close along the west shore of the main land to avoid the strength of the current, and the bank extending from Remedios islet to Jurupari island. Anchor in 6 or 7 fathoms north-east of Macapa fort, outside a ridge of soft rocks; but small vessels anchor in the channel between the ridge and the main.

ROUTES up the AMAZONS.—There are several routes from the anchorage off the town of Macapá up the Amazons; that on the east or along the west shore of the islands of Porcos and Gurupa as far as that of Rasa, at about 40 miles up, carries from about 22 to 5 fathoms water; the latter depth is between the shores of Gurupa and Rasa island, west of it. A bank extends south-west from Rasa island for a distance of about 3 miles to abreast the Boca de Maraca on the western shore. The channel is here narrowed, with a depth of only 13 feet, by another bank of sand and mud which runs north-eastward along the shore of Gurupa from the Nova islets.

The channel, therefore, eastward of Rasa is impracticable for vessels of more than 13 feet draught. Therefore a vessel of large draught should take the channel westward of the Pará group; it is somewhat difficult, but is larger, and has deep water in its navigable course. From the Nova islets to the Cajary islands the channel is deep, and a vessel can pass through the middle of the Cajary group or in the channel separating them from the main land. From the Cajary group to the south point of Gurupa island, a distance of about 45 miles, the channel is clear with deep water, and although considerably narrowed by Arruans island its navigation is easy.

Between the south extreme of Gurupa island and Boulonnaise point is the junction of the south-east arm, or Pará river. Here the stream of the flood tide ceases to be felt. At Obidos, about 240 miles farther to the westward, the influence of the tide is only felt by a periodical diminution in the strength of the descending stream, and by the rising of the water during the flood tide.

The **NORTH BRANCH** of the main channel to the Amazons is formed by Caviana and the smaller islands with the extensive shoals extending north-eastward from them, and the main-land to the north-west. In the channel are numerous low islands and shoals having deep water between them. Small vessels prefer the passage westward of the islands for entering and leaving the river. In the west part of this channel, at full and change of the moon, a tidal phenomenon occurs known by the name of *prororoca*.

ARAOUARI.—The mouth of this river is a little northward of Barlique island; the most northern of the group in the northern branch of the main channel. Here the *prororoca* is extremely violent. The river is supposed to be connected by channels in the interior with that of Oyapok and with Mapa lake.

TEMPERATURE.—The temperature of the coasts of the province du Pará and in the river of the Amazons varies between 70° and 92° during the day, and between 67° and 72° during the night; the heat is, however, easier to bear than one would suppose from the height of the thermometer, because the air is cooled by the vicinity of large water-courses and lakes, as well as by frequent and periodical rains, almost always accompanied by violent squalls. The difference between the temperature by day and that by night is, as has been seen, very great; the refreshing coolness of the night is more dangerous if indulged in too freely without taking any necessary precautions, which is one of the principal causes of the prevalent disorders in this province.

BAROMETER.—The barometer is almost stationary in these latitudes, only varying between 29·9 and 30·1.

ELECTRICITY.—We do not think that on any other part of the globe electrical phenomena are produced with greater frequency and intensity than on the coasts of Pará, and especially in the river Pará, and that of the Amazons. Nothing, indeed, can express the force with which these phenomena sometimes appear; houses, vessels, the earth itself trembles at every commotion as if shaken by an earthquake; and the sky, the colour of bitumen, is incessantly broken during the storms by the lightnings, which sometimes illumine the whole horizon.

It is seldom, however, that the lightning affects the town of Pará, the churches of which, with their high spires, seem as if they must be struck every day. The large trees in the neighbouring forests, doubtless, serve as conductors, for it is on them that the electric fluid generally descends.

CLIMATE.—The climate of the province of Pará is generally healthy, though several of its localities under unfavourable circumstances are unhealthy and subject to endemic disorders, such as intermittent and pernicious fevers, dysentery, and catarrhal and nervous affections. To prove

the healthiness of this climate, it is only necessary to refer to the healthy condition of the *Boulonnaise*, which, during three years spent in surveying the coast and rivers, only lost three men from the effects of the climate, yet the nature of the work placed the crew of this vessel in most unfavourable circumstances as regarded their health, in requiring the constant use of the boats, often without any shelter during the nights, or protection against the heat of an equinoctial sun, and without any other food than lard and biscuit, which was often wet and damaged. Numerous examples of longevity support the opinion that the climate is generally healthy.

The seasons.—As in all equinoctial countries, the year here is divided into two seasons, the rainy or winter, and the dry or summer season. The former begins generally in January and ends in June, the latter begins in July and ends in December. In the winter the rain sometimes falls without interruption and very heavily for a whole week, during which time the sun is rarely seen. The river and its affluents begin increasing from the commencement of this season, and in December the large lakes are united with the rivers, and in their course carry the remains of vegetable and other matter which are deposited and formed on their surface during the dry season.

Then the water of the rivers near the lakes is unwholesome and dangerous, and is only fit to drink by filtering, or by the immersion of a red-hot iron, the effect of which is to neutralize the vegetable matter. The waters continue increasing till the rains are over, and the river carries along with it an abundance of remains of vegetables, of entire trees, and sometimes of floating islands torn from the banks. When the rains have ceased, the river, which has overflowed all the low lands, soon falls to its bed, and leaves as traces of its passage a fertilizing soil, and thousands of trees it has washed down, and which are carried off into the sea at the next overflowing.

WINDS.—In the summer the winds blow continually from the east, moderately during the months of July and August, but very strong during the other months of the season. They are called general winds. It is then that the daily squall is most violent, and sometimes acquires great force. The winds in summer veer from about E.N.E. to E.S.E. As the general winds blow up the river, that is the best time for ascending the Amazons. The country boats, when going to Pará from the upper part of the river, drift along without sails, being quite incapable of working against a contrary wind, which is often very strong.

In winter, the general winds are only felt at long intervals; the calms predominate, and are only interrupted by heavy squalls of wind from the N.E. round by west to S.W., accompanied by torrents of rain. The navigation then becomes slow and difficult upwards, whilst the descent of the

river becomes more rapid from the increased power of the currents. The abundant rains are not the only cause of the annual inundation of the basin of the Amazons, but another cause may be found in the direction of the winds at that season; which blowing from North to N.E., sometimes with violence, against the tide in the river, the latter becomes swollen thereby, and extends over the low lands.

TIDES.—The tides in this vicinity are subject to so many variations and irregularities, that it is difficult to denote precisely what course they follow; their exact duration, their height, their strength, all depend on the force of the wind, on the abundance of rains or capricious changes in the direction of the current. They may be divided into two distinct classes, those which occur between Maranhão and the mouth of the Amazons, and those from the east mouth of the river as far as Cape North. The first are regular, and though affected by the various rivers, they follow the general law of tides of six hours.

Their direction and strength vary according to their distance from land; the flood tide generally runs S.W. near the coast, and W.S.W. at some distance from it; it has a mean rate of $2\frac{1}{2}$ miles an hour near the land, which diminishes in proportion to the distance from the coast. The ebb tide sets E.N.E. near the coast at the rate of 1.8 miles an hour, and trends towards the north with diminished strength, in proportion to the distance from land. The rise of the tides varies according to the localities; it may be said, however, that about 4 miles from the coast, where the local influences have no power, the rise is 14 feet at springs, and 10 feet at neaps.

The surface water of the Atlantic ocean, continually blown towards the west by the general winds, cause a current to the north-west, which generally attains a rate of 2 miles an hour, and sometimes as much as 4 miles. At the right angle of the stream of the Amazons the current trends towards the north, produced by the mass of water projected towards the north-east from the river; but it soon attains the mastery, and carrying along with it the water thus projected, acquires greater force.

The flood tide, which runs to the S.S.W. near the mouth of the river, inclines towards the S.W. and W.S.W. in proportion to the distance from the land; and the ebb tide, which sets first N.E., inclines towards the North and N.W. before it is united with the general current. A difference of 2 or 3 hours in the establishment of two points far from land and only 12 miles apart, and a rise of only $6\frac{1}{2}$ feet 12 miles from a point, where at the preceding tide nearly $29\frac{1}{2}$ feet had been observed, are two anomalies in the tides quoted as most remarkable amongst others less striking, though numerous on this coast.

As soon as the flood tide begins, the sea near Marajo island rises almost

suddenly ; during winter it generally rises 16 feet at the springs, and as much during the first two hours as the remainder of the flood. It runs about 6 miles an hour, and along the coast between Macapá and Cape North from 8 to 10 miles an hour ; the velocity being so great that it is impossible to remain at anchor in the middle of the stream of the current. As the currents are much stronger near the north side of the mouth of the Amazons than in any other part, the stream of the flood is felt there later ; it therefore follows that near Marajo island, where the flood tide has been felt for a time, whilst the ebb still continued on the north side, the level of the sea must be higher near Marajo island.

From the moment when the power of the ebb tide is abated on the north coast, and the flood from the sea gains the ascendancy, the waters heaped up from the side near Marajo island flow with rapidity towards the north coast of the river's mouth, in order to find their level ; at the same time the principal current from the north-east brings a considerable mass of water ; and these two causes produce a sudden elevation in the river, which usually takes place without any extraordinary agitation. The tides are felt at a great distance up the Amazons. The stream of the flood is observed in the north branch as far as Boulonnaise point above the mouth of the Xingu, but it is not so perceptible in the south branch, where it does not run beyond the mouth of the Lemaó.

Above the Arroyolos, the flood tide is only perceptible by the periodical diminution of the descending current and by the swelling of the water, which at Obidos is about 13 feet at spring tides.

CURRENTS in the AMAZONS.—The waters of the Amazons rise during six months, and then, having reached their greatest elevation, fall during the other six months of the year. They begin to rise in the month of November ; the inundations take place in January, February, March, April, and May. The people of the country attribute the inundations to the abundant rain which falls during this season in all the countries watered by this river. It appears, however, that the rain is not the only cause ; the winds from the N.E. which then prevail, and blow strongly at the river's mouth, must retard the stream of water from the river, and contribute greatly to the inundations.

Indeed, very little rain fell in 1824 and 1825, notwithstanding which the inundations took place, but the waters were not so high as during the preceding year. Observations have shown with certainty that there is a difference of level, for during the rainy season, when the stream of the ebb tide should be the strongest, it is on the contrary those of the flood tide which have the greatest velocity. The stream of the flood tide, from the mouth of the river as far as 90 or 120 miles up the river, begins in December to be stronger than that of the ebb. At Cape North,

during January, February, March, and April, the flood runs more than 8 miles an hour in springs, and at the ebb from 2 to 4 miles.

In May the stream of the ebb is as strong as that of the flood ; after May the ebb begins to be the strongest, and the flood the weakest. In August and September the flood is weak, while the ebb runs 5 or 6 miles an hour, but it loses its velocity gradually in October, and in November, the period at which the N.E. winds begin to blow, its strength is the same as that of the flood, which begins to take the ascendancy in December.

From this it may be concluded that the waters of the sea are higher than those of the river every time that the flood stream is stronger than that of the ebb, that is to say, in December, January, February, March, and April, when the winds blow strongly from the N.E., and also that the waters of the sea are lower than those of the river, or at least have the same level, when the ebb stream is stronger than that of the flood, which is the case in June, July, August, September, and October, when the winds are from the E.S.E. On the 28th of August 1743, the tide was felt at Pauxis, more than 600 miles from the mouth of the river ; the currents were continually descending, but the level of the water rose.

We may attribute the rise of the water at the mouth of the Amazons to the influence of the winds from the N.E. It has been remarked, as we have already mentioned, that these winds cause the waters to rise on the coasts of Guayana. It is natural to suppose that they produce the same effect at the mouth of the Amazons, where they blow with the same force ; however, as the mouth is funnel-shaped, and narrows abruptly, the same force should produce a greater elevation. As the winds from the N.E. do not always blow with the same strength, the result is that sometimes the waters are not so high, because they flow off more easily ; and sometimes they are higher, because the N.E. winds have greater power to keep them back. These variations in the level have probably prevented any fixed data with regard to the degree of mean elevation which the waters of the river generally attain.

The differences in level which the waters of the interior of the Amazons have alternately with those at its mouth, give to the inundations of that river a peculiar and totally different order of motion to that which takes place in other rivers. "When a large river increases," says Buffon, "the swiftness of the water always increases more and more, till the river begins to overflow ; from that moment the speed of the water diminishes." It is the contrary in the river Amazons ; in proportion as it increases, the rate of the water diminishes till the time when it begins to overflow. It then remains at its lowest speed for some time, and the current does not begin to increase in velocity till the moment when the water begins to fall.

This slackening in the flow of the water at the very moment when its abundance causes the river to swell proves that there is an influence against the tide at its mouth, which can only be that caused by the greater elevation of the level, and confirms what has just been said of the continued action of the N.E. winds.

The plains of Brazil, on the right bank of the river, are generally higher than those of Guayana on the left bank; therefore the overflowing waters of the Amazons spread over the latter, and are increased by the water from other rivers, and that caused by rain. Thus the immense plains of Guayana become at last almost entirely under water; and it cannot be surprising that there should be communications between the Amazons and the greatest part of the rivers of these vast countries. Persons who have been surveying the interior of Guayana have entered the Rio Negro, and reached as far as the banks of the Orinoco and the river Essequibo in their canoes.

THE PROROROCA, or Bore, is a tidal phenomenon which occurs between Macapá and Cape North, where the mouth of the river is contracted by islands, but especially opposite the mouth of the Arauari, which enters the Amazons on the north. During the three days nearest the full and new moon, or at the time of spring tides, the sea, instead of taking nearly six hours to rise, attains its greatest height in a few minutes.

As soon as the tide has ceased ebbing, at the distance of from 3 to 6 miles, a roaring sound is heard at sea, which denotes the approach of the prororoca or heavy rollers; as it approaches the noise increases, and soon a promontory of water, 12 or 15 feet high, is seen; then another, then a third, and sometimes a fourth, which follow each other closely, and occupy almost the whole breadth of the channel. It approaches with great rapidity, breaks, and carries away in its course everything opposed to it.

When these waves have rolled on, the noise wears away, and the stream of the flood continues regularly, but without perceptibly raising the level of the water, which has acquired almost all its height of 42½ feet in the vicinity of Cape North, in the short space of about ten minutes which has elapsed between the first and last wave.* It is the most dangerous during the winter months. In some places tracts of land are carried away by the prororoca, large trees torn up by the roots, and destruction of every kind ensues.†

* The commander of a vessel which was wrecked in April 1825 near Cape North, declares he found 30 feet of water in places which had been quite dry before the flow of the tide.

† The *Boulonnaise* fell in with a floating islet, a cable in diameter, with a living iguana on it.

FRENCH GUAYANA, the smallest and the most eastern of the three colonies of Guayana, is in possession of the French, who first settled in Cayenne in 1604. It is about 250 miles in length, north and south, 100 to 150 miles in breadth, and has an area of 27,560 square miles. Its coast line extends from the river Oyapok to the Maroni, a seaboard of about 170 miles in length. The low alluvial tract along the coast is of great fertility. The mountain chains run east and west, and are wholly of granite, but do not attain a great elevation.

The trade of French Guayana is chiefly with France and its colonies. Besides the staples of British and Dutch Guayana, its productions comprise pepper, cloves, cinnamon, and nutmegs. In 1862 the population was 19,599; and at the same date the total value of imports and exports amounted to about 349,062*l.* The amount of tonnage inwards and outwards was 11,162.

CAPE NORTH (Cabo do Norte).—The coast from the mouth of the Arauari runs about N.N.E. for a distance of about 33 miles to Cape Norte, which forms the north-westernmost limit of the mouth of the Amazons; the cape is low and woody, but more elevated than the adjacent land, which is frequently overflowed. It is fronted by an extensive flat with small shoals; the 5-fathom line of soundings curving with large inflections at about 45 miles northward of the cape to about 35 miles eastward of it, and then trending in the direction of Cape Magoari, the north-east extremity of Marajo island.

From the cape the general trend of the coast is N.N.W. for 190 miles to Cape Orange. The whole shore continues low and is bounded by mangroves of moderate height, which cannot be seen at a greater distance than 10 or 12 miles, and being exposed to the varied and violent action of the waters of the Amazons and other smaller streams the outline often changes. Soft mud flats, formed by the debris thrown out of these rivers, extend off in some places to a considerable distance, upon which the mangroves advance with great rapidity in the dry season, and are torn up again by the violent current and tides produced by the freshets in the rainy months.*

PARAITARI and MARACA ISLANDS.—The coast from Cape North sweeps round to the north-west and west, forming a deep bight, encumbered with shallow banks and mangroves, which have formed two islands. Tourlouri channel, between these islands and the main, is from 3 to 6 miles wide, but towards the south-east end it is nearly choked up by mud flats, leaving a small passage near the main land for vessels of

* See Admiralty Chart:—South America, East Coast, Sheet 2, Surinam to Cabo do Norte, No. 1,802, scale, $d = 3.3$ inches.

light draught. The south end of Paraitari, the south-easternmost of these islands, lies N.W. by N. about 12 miles from Cape North, and is about 2 miles in diameter, and being surrounded by shallow banks is inaccessible; there are only $3\frac{1}{2}$ fathoms water, at nearly 40 miles N.E. of it, and the flat in this direction is steep-to.

Maraca, the other island, appears to be about 30 miles in length N.W., and S.E., but divided into two parts by an opening called Calebasse creek, the western mouth of which forms, with the south side of the north-west part of the island, a bay sheltered from the sea and strong currents which are found in the Tourlouri channel, and affords the only sheltered anchorage to be found off this shore. It is observed, that the north-west end of Maraca being out of the influence of the current, the mangroves remain stationary.

ANCHORAGE.—The best anchorage off Maraca will be found with the western extreme of the north-west point of the island bearing W. $\frac{1}{2}$ N., the north point of the entrance to Calebasse creek, N. $\frac{1}{2}$ W., and the south point of the entrance to the river Mapa, West; it is said a vessel here will have not less than 19 feet at low water, and be sheltered from the current and rollers. A greater depth will be found farther off Maraca, but the current is so very strong that the anchorage would be untenable in the spring tides. The latitude of this anchorage is $2^{\circ} 8' N.$

DIRECTIONS.—In standing for the anchorage of Maraca island, it will be necessary to approach the island from the N.N.E., following its north side at the distance of about 4 miles, closing gradually as the vessel advances to the south-westward. The anchorage is plainly pointed out by the opening which forms Calebasse creek, and a vessel may pass close round this end of the island.

The bottom in front of this part of the coast is composed of mud, more or less hard. The 5-fathoms line of soundings passes, with large inflections, about 18 miles northward of Maraca island, and curves towards the shore near Mont Maye, within $2\frac{1}{2}$ miles; it then increases its distance generally to 7 or 8 miles, until near Cape Cachipour, when it trends along the coast at a distance of about 18 miles eastward of Cape Orange, and 8 miles northward of it. Outside the 5-fathoms line the depth increases very gradually until near Cape Orange, when the water is deeper for the distance of 40 or 60 miles along the coast, the depth, outside the 5-fathoms line, being from 11 to 22 fathoms, and the mud mixed with fine sand.

TIDES.—It is high water, full and change, at the anchorage off Maraca island at 6 h. 0 m. The water, however, reaches its highest level $2\frac{1}{2}$ or 3 hours after the commencement of the flood, and at the equinoxes it has been known to rise 37 feet and the stream to run for a short period at the rate of 7 knots. Its strength, however, rapidly diminishes after three or four days from the full and change. The violence of the sea at the

period is very great in the offing. The difference between the level of low water at the springs and neaps seldom exceeds $8\frac{1}{2}$ feet. The stream always runs to the N. W., and at the period of high water the land is all overflowed, except at a few spots near the north-west end of the entrance to Calebasse creek.

CAUTION.—It may be observed here, that the toredo is most destructive to boats' bottoms in these waters, and they cannot be too often cleansed.

RIVERS.—The principal streams which disembogue on this part of the shore abreast Maraca are the Paraitari or Maprouenne, the Mapa, and the Manaye; the two latter communicate with extensive lagoons that occupy the low lands between the Tourlouri channel and the course of the Araouari; the mouth of the Mapa is directly facing the Calebasse creek, or opening.

At 18 miles N.N.W. from the Mapa is the Mayécaré, which communicates in the interior with the Mapa; and 9 miles beyond this, in the same direction, is the Carsewène. The entrance to the Carsewène is obstructed by a sand bank which extends off to the distance of about 3 miles, and at spring tides it breaks heavily, and produces an effect similar to the proroca or rollers; at all times, but more particularly at this period, boats should be extremely careful how they approach this river.

MONT MAYÉ.—At about 20 miles N.N.W. from the Carsewène, or in the parallel of $2^{\circ} 50' N.$, there will be seen above the mangroves, a short distance inland, a small space covered with trees more lofty than those in the neighbourhood; it has the appearance at a certain distance of a hill, and is called Mont Mayé. This is the most remarkable object between Capes North and Orange, and in clear weather may be seen at a distance of 16 miles.

RIVER CONANI.—The mouth of this river is known from the many small openings between this and the Cachipour river by its proximity to Mont Mayé, from which it is distant in a northerly direction about 6 miles. Between Mont Mayé and Cape Cachipour the shore trends N. by W. 5 miles, and is more bold. Abreast the Conani there are 6 fathoms at 3 miles, and abreast the Cape there is the same depth about 9 miles off.

RIVER CACHIPOUR.—Cape Cachipour, a low tongue of land, stretches to the north-east, and forms the southern point of the river Cachipour. The entrance to the river, which is about 8 miles westward of the cape, is large, and may be recognized by some lofty trees on the west side, extending along its left bank and overtopping the neighbouring mangroves:

From the Cachipour the shore, which is partly drowned, and only visible at the distance of about 8 miles, trends to the northward for 7 or 8

miles, when it takes a N.W. by N. direction to Cape Orange, which is 44 miles from Cape Cachipour. A shallow flat extends off this part of the coast about 13 miles, at which distance the depth is only 3 fathoms. In clear weather two remarkable mountains will be seen in the interior, which are excellent guides for this part of the coast.

CAPE ORANGE.—The land about this cape is very low, but as this promontory forms the eastern side of the entrance of the Oyapok river, it is easily discernible from the eastward, and from this quarter the hills on the west side of the river will be seen behind it. The mangroves which form the extremity of the cape are much higher than those in the neighbourhood, and are visible at a distance of 12 miles.

The mud bank extends out about 15 miles to the eastward of the Cape, at which distance there are only 3 fathoms water; but, to the northward of the Cape, the great strength of the current from the eastward, and the stream of the Oyapok from the south-westward, sweeps away the mud from the shore, and at 6 or 7 miles in that direction there are 5 fathoms, and the bank being steep-to, serves as a guide to this part of the shore. This would imply that the bottom is rocky, as pointed out on some charts; but the numerous soundings recently taken in this neighbourhood, by French surveyors, show no such indications. In rounding the Cape, a vessel should not come within the depth of 5 fathoms.

RIVER OYAPOK.—From Cape Orange the land turns to the S.W. and South to the entrance of the Oyapok, the western shore of which trends to the N.N.W., forming a large funnel-shaped bight 12 miles wide at the outer extreme, difficult and dangerous to navigate. The western shore presents behind the low and drowned land many hills and mountains which appear at a distance like islands, and are the first elevations of the chain occupying the interior between the Oyapok and Cayenne.

MONT D'ARGENT, the most salient of these hills, rises close to the north-west point of the entrance of the Oyapok, and in clear weather the grove of trees on its summit may be seen more than 20 miles off; it may, however, be mistaken for the Carimaré, which is of the same form but situated farther to the westward. Between these two mountains there is also a hill of the same form, but much smaller and less elevated, called False Mont d'Argent, and behind it again several other peaks, the most remarkable of which are the Trois-Ermîtes (Three Hermits). Near the bottom of the funnel-shaped bight, on the point of land which separates the Ouanari from the Oyapok, stands Mont Lucas, a small but moderately elevated hill.

DIRECTIONS.—Having passed through the entrance of the Oyapok, a vessel will find good anchorage in 4 fathoms water, with Mont Lucas bearing West, distant $1\frac{1}{2}$ miles, or she may proceed higher up. About

3 miles above Mont Louis is the island of Veneska, which at high water is frequently overflowed; the best channel is to the westward of it, where there are 4 fathoms close to the shore. Beyond this there are several other small islets, but they do not obstruct the navigation. About 15 or 18 miles higher up, a fine bay opens out in which there is anchorage in 2, 3, 4, 5, or 6 fathoms as close to the shore as convenient.

Here is situated Fort St. Louis of Oyapok, and farther up there is another fortress called St. Paul. The Oyapok takes its rise far up in the interior, and, being joined by several lesser streams, conveys a large and rapid body of water to the sea, so that vessels should not enter before the commencement of the flood.*

TIDES.—In the neighbourhood between Capes North and Orange it is high water, full and change, at 6h. 0m., and the rise is from 12 to 15 feet; the flood runs W.N.W., and the ebb N.E. about 3 knots an hour. In the offing the current takes a N.N.W. course and runs about 2 knots.†

The COAST, from the base of Mont d'Argent, sweeps round to the north-west, and the low mangroves can only be seen at a short distance. A little to the westward of the meridian of Mont Carimaré, and about 20 miles from Mont d'Argent, the shore terminates abruptly at some high mangroves, which form Béhague, the eastern point of entrance to the river Approuague. This point is prominently seen from the eastward, appearing detached from the adjacent low shore. A bank of soft mud stretches off from it to the northward, which skirts the shore at a considerable distance, all the way from the Oyapok, the 3-fathoms line of soundings being 8 or 9 miles off, and appears to increase its distance every year.

The RIVER APPROUAGUE is said to be the deepest of the rivers of Guayana, and the easiest to navigate. Vessels of very light draught can proceed as far up as the settlement about 12 miles from the mouth. The entrance, which lies W.N.W. about 30 miles from Cape Orange, is easily distinguished, first, by Béhague point and afterwards by the wide opening at its mouth, within which, at about 6 miles up from Béhague point, is the north end of the outer of two low narrow islands, lying in mid-channel and running north and south, from which a sand bank extends northward more than a mile. There is a channel on either side of the outer island for vessels of about 6 feet draught, and westward of the inner one.

The right bank runs nearly north and south, whilst the opposite side diverges to the N.N.W. and N.W. without forming a distinct point, consequently all the mud carried away from the river is deposited to the westward, and forms an extensive shallow flat, only passable for vessels

* West India Directory, Part 3, by J. W. Norie, 1855.

† Blunt's American Coast Pilot, 18th edition, p. 629.

of very light draught. The river winds inland far to the westward, and is reported to join the Marowine.

CONNÉTABLES (Constables), are two small rocky barren islets, the easternmost of which lies North about 15 miles from Béhague point. This latter being the largest is called the Grand Connétable, and is about 160 feet high, of a rounded form, with a flattened summit, and may be seen in clear weather from a distance of about 25 miles; it is bold and steep-to. The other, called the Petit Connétable, and lying W.S.W. about a mile and a half from the larger islet, is quite flat, and at high water spring tides it is not more than 3 or 4 feet above the sea; to the northward and southward breakers extend off about one-third of a cable's length.

In the channel between them the depths are from $5\frac{1}{2}$ to 7 fathoms. Between the islets and the mud bank which skirts the shore, the soundings gradually and slowly increase in depth from the shore; but outside them they deepen abruptly from $8\frac{1}{2}$ to 19 fathoms; this latter depth is more than 3 miles from them.

BALLURES is a dangerous shoal, lying N. by W. about 6 miles from the Grand Connétable, with depths from 10 to 13 fathoms between on hard sand. Although the sea has been seen frequently to break in this neighbourhood, it has been hitherto attributed by most navigators to the heavy rollers which prevail on this part of the coast at certain periods. Soundings, however, have been obtained recently which clearly indicate the existence of this shoal, although the exact depth is not given; it must, however, be of very small extent, from the frequent searches that have been made for it without success.*

CURRENT BREAKERS.—During summer the current runs strong to the north-west in this neighbourhood, but in the winter it is overcome to a considerable distance from the land by the tides; especially on the ebb at springs, which being augmented by the large stream from the Approuague, rushes out to the North and N.N.W. with great force, causing at 3 or 4 miles outside the Connétables heavy breakers, which generally subside at slack water, if the outer current is feeble. The line of ripple or broken water has the appearance of shoal ground, as it runs along the edge of muddy water.

TIDES.—Between the little Connétable and the land it is high water, full and change, at 5h. 0m.; springs rise $8\frac{1}{2}$ feet, and neaps from 4 to 5 feet.

* M. Montravel, 1851; who states, "I am convinced of its existence, for in passing 4 miles north of this island the sea broke so high and with such force, that it was not possible to attribute the breakers to the action of the current. The heavy sea prevented my sounding."

THE COAST, from the Approuague to the river Mahury, a distance of 27 miles, trends to the north-west, and is only visible from a distance of 7 or 8 miles ; it is backed, however, by a uniform ridge running parallel to the shore and not far inland, named the Kaw mountains, which may be seen at a great distance, and is a good guide to vessels passing outside the Connétables.

THE RIVER KAW disembogues about 15 miles to the north-westward of Béhague point, but it loses itself among the mangroves, and the entrance is consequently difficult to discover.

RIVER MAHURI.—The mouth of this river is bounded on the west by the island of Cayenne, and lies directly under the lofty plateau of Mahuri, one of the most elevated points on that island, its base resting upon Cape Diamant ; the entrance is therefore easily made out. The eastern side of the river is very low, and the debris washed out, depositing itself on this side, forms an extensive shallow flat which sometimes reaches out nearly to the Remire islands, leaving the deepest part of the channel towards the Cayenne shore. Although this river has less depth at its entrance, and is more difficult to navigate than the Cayenne, it has more water within the bar, which enables a vessel drawing over 12 feet to lie afloat at all times, an advantage which the other does not possess.

REMIERE ISLANDS are five small rocky islets lying on a N.W. and S.E. bearing, from 2 to 3 miles from the north-east side of the island of Cayenne, and about 18 miles to the westward of the Connétables. Malingre (peaking), the north-westernmost islet, Père (father), the centre one, and Mère (mother), the south-easternmost and largest, are of considerable elevation, and the two latter may be seen soon after making the high lands of Cayenne, and from off the Connétables. The other two, called the Mamelles (teats), are very small and about 80 feet high, and lie close together, about a mile to the eastward of Mère islet.

The tides and current set through between these three latter islets with such extreme velocity, that they are dangerous to approach in light winds.* Père islet lies N.N.W. about 2 miles from the Mère, and is much smaller and lower ; about a cable's length from its south point there is a rocky head, with only 4 feet on it at low water ; and at a quarter of a mile from its north-west point there is a shallow rocky ledge. Malingre lies N.W. by W. 3 miles from the latter, and is still smaller and lower. In the openings between Mère, Père, and Malingre, the soundings are from $3\frac{1}{4}$ to $4\frac{1}{4}$ fathoms.†

* See Admiralty Plan :—Entrance of the River Cayenne, No. 534 ; scale, $m = 1\cdot0$ inch.

† M. Tardy de Montravel, 1851. The Admiralty Plan shows much less water between Mère and Père.

ENFANT PERDU.—This small flat rock lies N. by W. 6 miles from the lighthouse at Cayenne, and about 7 miles E.N.E. from Mont Macouria, and is a good guide for the river. It is elevated only a few feet above the sea, and from its base a flat rocky ledge extends out a cable's length, and always breaks. The space between the rock and the main is obstructed by a bank of hard sand and mud, which gradually increases in depth from the shore. At 5 miles north and east of the rock, there are only $2\frac{3}{4}$ fathoms at low water over muddy bottom.

LIGHT.—An iron quadrangular tower stands on the *Enfant Perdu*, which exhibits, at 33 feet above the sea, a *fixed* white light, visible in clear weather from a distance of 10 miles.

ST. FRANÇOIS ROCK.—At nearly $2\frac{1}{2}$ miles W. by N. from Malingre islet, lies a dangerous rock called the St. François, which never uncovers, and in approaching the river Cayenne from the eastward, care should be taken to keep the *Père* open eastward of the Malingre until the north-west point of Cayenne bears to the southward of S.W.

MACHOIRAN BLANC is a small rock lying about S.S.W. $1\frac{3}{10}$ miles from the Malingre, and about midway between it and the land. N.N.E. $1\frac{1}{2}$ cables' lengths from it there is a small head which uncovers at low water. Vessels drawing 12 to 14 feet may pass between it and the Malingre, but it requires great caution, and this channel is only navigated by coasters.

ISLAND and RIVER of CAYENNE.—The island of Cayenne is bounded on the east by the river Mahuri, on the west by that of Cayenne, on the south by a canal which unites these two streams, and on the north by the sea. Being mountainous, it presents totally different features from any other part of the coast of Guayana. Its north-east shore is formed of sandy bays separated by bold rocky heights, which decline towards the south and west; the north-west extreme terminates at a low point on which is situated the city of Cayenne, at the eastern side of the entrance of the river, and which contains about 5,500 inhabitants.

Off the north point of the island, at the distance of three-quarters of a mile, is a cluster of rocks, and within them the Dupont islets. At nearly a mile westward of the latter are the rocks Anglaises. At about 3 cables to the westward of the east point of the entrance there is a small rock, which is sometimes covered, called *Aimable*, and on which there is a beacon; the white and green lights in line bearings S.E. by S. lead on it. Two cables to the southward of it is the *Maillard*, which has 9 feet water on it; and about three-quarters of a mile farther up, is the *Cheval blanc*, which is also sometimes covered. The western side of the river is bounded by a sand bank stretching off nearly $1\frac{1}{2}$ miles to the northward from Macouria point, leaving the entrance about half a mile wide.

all remarkable objects at a long distance, and good guides for the entrance of the river. The mouth lies between low points, the southernmost projecting out a little distance beyond the other. It is very narrow, but deep enough for vessels of moderate draught, and has the advantage of good anchorage in the immediate neighbourhood for those of the largest draught.

GARADIER ROCKS.—East about 4 miles from the entrance of the river Kourou and the same distance North of the Macouria are the Garadier rocks, which are generally 3 feet dry at low water springs, but seldom visible at ordinary tides. Lying immediately in the route of small vessels passing to and fro from Cayenne, they are of course very dangerous, and the more so as their position is doubtful.

KOUREOU ROCKS.—These two dangerous rocks lie between the Garadier and the entrance of the Kourou river, about $1\frac{1}{2}$ miles off shore. They uncover at low water and are directly in the way of vessels visiting the Kourou. At about 3 miles N.W. of the Kourou river there is a well defined point with some rocks at its base called Charlotte point.

SALUT ISLES.—This group of three small rocky islets, occupying a space of about three-quarters of a mile, lies N.E. 7 miles from Charlotte point, and N.W. 25 miles from Cayenne. They are inhabited, and upon them are extensive government buildings. Anchorage in $4\frac{1}{2}$ fathoms, muddy bottom, will be found under the west side of the northernmost islet, with the prevailing east winds, about half a mile from the islet; and in the bight formed between St. Joseph and Royale islets there is still better shelter, especially for vessels of light draught, in from 3 to 4 fathoms. These anchorages are the best, indeed the only safe ones, for large vessels, on this coast, outside the rivers.*

LIGHT.—A lighthouse rises from the summit of the hospital on Royale islet, which exhibits, at 200 feet above the mean level of the sea, a *fixed* white light, seen in clear weather from a distance of 18 miles.

Water.—On the north side of Royale isle there is a small settlement surrounded by plantain trees, and some wells of good water; landing, however, is difficult, and the water must be carried to the boats in breakers.

REPORTED DANGERS.—In the first plan published of the Salut islands, in 1764, a rock which is said to break at low water is placed, N. 21° W. a little more than 2 miles from St. Joseph islet, and another, N. 42° W. nearly a mile from that islet; but they have frequently been looked for most minutely without success, and there is no account of their having been seen by the coasters, who are continually traversing this

* See Plan :—Salut Isles, on Admiralty Plan of the entrance of the river Cayenne.

the course by waving a white flag to the side that should be steered for. The changes, however, are so great, that to attempt to cross the banks at the entrance without assistance will incur great risk ; and at all events it must not be done before half-flood.*

ANCHORAGE.—Should it be found more convenient to anchor great care must be taken to see that the bottom is soft mud, which is generally pointed out by the smoothness of the water. On these spots, in the summer season between April and November, a vessel may venture into little more than her draught, as no damage will occur should she touch the ground. In the winter months and with spring tides, anchorage here, however, is attended with considerable risk, particularly if the anchor is dropped on hard mud. At this period the pororoa or rollers prevail with N.E. winds, rise so rapidly, and break so violently, that a small vessel is exposed to imminent danger.

With spring tides the sea will sometimes top after a long lull, without any warning whatever, in 8 fathoms water.† At all times a vessel should not bring up to the westward of the entrance. In the fine season a vessel of very light draught may anchor between the Père and Malingre islets, or between the latter and Cayenne, but it must be on soft bottom. A convenient berth lies to the eastward of the *Enfant Perdu*, with the fort at Cayenne bearing S.S.W.

TIDES.—The time of high water at full and change, at the entrance to Cayenne river, varies from 4h. 15m. to 4h. 40m.‡ At the equinoxes the rise is 9 feet, at ordinary springs 7 feet, and at neaps from 4 to 5 feet. On the bar at high-water springs, there are sometimes 17 feet water. The ebb from the river runs out N.N.W.; outside it sets to the N.N.E. and the flood to the N.W. at about 2 miles an hour.

THE COAST from the river Cayenne to the Kourou river trends N.W. by W. 21 miles, and is called Coast of Macouria. From Macouria point to the river of that name, 15 miles distant, it is low and sandy ; but about midway and not far inland is Mount Macouria, which at a certain distance appears like an island. The river is small, and the mouth so narrow that it is not easily found until close to it. Between the Macouria and the Kourou rivers the shore is bounded by mangroves somewhat more elevated than elsewhere.

RIVER KOUROU.—Close to the shore on the east side of the Kourou river is Mont Guatemala : a short distance farther inland to the south-west is Mont Condamine ; and on the west side is Mont Piriacabo. These are

* M. Lartigue, 1827. See also the end of this chapter.

† Capt. A. Darley, H.M.S. *Electra*, 1843, states 3h. 40m.

‡ Capt. A. Darley, H.M.S. *Electra*, 1843.

all remarkable objects at a long distance, and good guides for the entrance of the river. The mouth lies between low points, the southernmost projecting out a little distance beyond the other. It is very narrow, but deep enough for vessels of moderate draught, and has the advantage of good anchorage in the immediate neighbourhood for those of the largest draught.

GARADIER ROCKS.—East about 4 miles from the entrance of the river Kourou and the same distance North of the Macouria are the Garadier rocks, which are generally 3 feet dry at low water springs, but seldom visible at ordinary tides. Lying immediately in the route of small vessels passing to and fro from Cayenne, they are of course very dangerous, and the more so as their position is doubtful.

KOUROU ROCKS.—These two dangerous rocks lie between the Garadier and the entrance of the Kourou river, about $1\frac{1}{2}$ miles off shore. They uncover at low water and are directly in the way of vessels visiting the Kourou. At about 3 miles N.W. of the Kourou river there is a well defined point with some rocks at its base called Charlotte point.

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* See Plan :—Salut Isles, on Admiralty Plan of the entrance of the river Cayenne.

vicinity. It has also been stated, that a rocky bank of vast extent existed in these directions, on which there were 5 fathoms at low water, and 6 fathoms in the environs, but no bearings are given for its position.*

The current is rarely so strong at the Saluts as to produce the effects observable at the Connétables; nevertheless, the soft mud banks change their depths occasionally in the eddies towards the shore. These changes, however, cannot be very great, for, the stream not running always in the same direction, the mud deposited at the termination of one tide will be carried away by the next. While this doubt exists, it will be more prudent to avoid this space within the above bearings, especially as no inconvenience will result.

THE COAST from Charlotte point to the environs of the river Counamana, a distance of 30 miles, takes a N.W. by W. direction, the mangroves disappear, and the shore is low and sandy. Here and there will be seen a few habitations and small clumps of trees, and the whole line of coast is closely skirted by detached rocks, which become more numerous as Verte isle is approached.

CAUTION.—The Remire, Connétables, and Salut islands are the only points on the whole of this coast that could endanger a ship, should she touch them; it is therefore imperative to be cautious against the current. The passage between the Connétables should not be attempted without a leading wind; on the other hand, it is much better to anchor 9 miles from them, or to pass outside them at a sufficient distance to give a wide berth to the Ballures shoal.

MALMANOURI FLATS.—At about 10 miles W. $\frac{1}{2}$ N., from the Salut islets, there is a chain of rocks about 2 miles from the shore called the Flats or batteries of Malmanouri. It is 2 miles in extent east and west, and one mile north and south; its edges are hard mud, and the breakers over it may be seen at a distance of 2 or 3 miles. The sea is heavier here than on any other part of the coast.

MONT DIABLE.—S.W. from the Malmanouri flats, and about 9 miles inland, there is a very remarkable conical hill, called Mont Diable, which may, in clear weather, be seen from a distance of 20 miles.

VERTE ISLE.—This small islet lies about $1\frac{1}{2}$ miles from the shore; W. by N. 17 miles from the Salut islets; and N. by E. from Mont Diable. It is very low, and partially covered with dwarf shrubs, so that it is difficult to make out. There is a channel between it and the main for small vessels, but it is said to be filling up.

RIVER SINAMARI.—From abreast Verte isle the coast runs W.N.W. for 5 miles, to the mouth of the Sinamari, and presents no remarkable

* M. Lartigue, 1827.

object whatever, until the eastern side of the river is approached, where the mangroves form a grove higher than those in the neighbourhood. A good guide will be found in Mont Corosoni, which bears S.W. $\frac{1}{2}$ W. from it. A mud flat extends out about 6 miles, which renders the approach difficult.

COROSONI ROCKS.—To the westward of the Sinamari the shore is low and sandy, and for more than 6 miles is skirted by a ledge of rocks, called Corosoni or Boulonnaise, which extend off about a mile from the shore, with shallow ground a long distance northward of it.

RIVER COUNAMANA.—The entrance of this river is about 10 miles to the westward of the Sinamari, but is difficult to find, and like the latter, is only fit for very small coasters. Near the mouth of the river there are some huts, and a little to the westward of the river a remarkable ridge of irregular conical hills called the Iracoubo mountains, which extend in a W.N.W. direction about 12 miles, and is the last elevated land that will be seen to the eastward of the Maroni river. The easternmost hill of this range bears S.W., about 8 miles from the mouth of the Counamana, and may be seen 15 miles off.

BOURGEOIS ROCKS.—From the Counamana river the shore trends W.N.W. 7 miles to the Iracoubo. At about midway between the two rivers, and a short distance from the coast, is a small ledge called the Bourgeois rocks, which are the last that will be met with in proceeding to the westward.

CAUTION.—In navigating this part of the coast, care should be taken not to come within the depth of 4 fathoms, to avoid the ledges just described between this and Cayenne. These are the only dangers to be guarded against, for it is to be observed, that wherever the shore is bounded by mangroves the bottom in front is muddy, deeper, and bolder than elsewhere.

RIVERS IRACOUBO and ORGANABO.—The Iracoubo will only admit coasters, and is difficult to discover. From thence to the Organabo the coast still trends W.N.W. for 13 miles, and is bounded by a low sandy shore scantily clothed here and there with clumps of brush wood. The interior is nearly drowned, and cut up by extensive lagoons. The mouth of the Organabo bears N. by W. from the western end of the Iracoubo hills, but it is difficult to find until close to it; and it is so narrow and shallow as to be only fit for small coasters. Near the mouth there is a clump of mangrove trees, which at a certain distance has the appearance of an island, and is called by the fishermen *Ilet-aux-Canards*; and this is the only remarkable object on the shore between the Organabo and the river Maroni.

RIVER MANA.—At about 10 miles to the westward of the Organabo, high land begins to rise from the interior, and trending towards the North terminates near the entrance of the river Mana, W.N.W. 28 miles from the Organabo. The Mana will only admit small coasters at high water, the mouth being blocked up by a mud flat which runs to the north-west for 6 miles from the east side of the entrance.

The RIVER MARONI, or Marowyne, which forms the western boundary of French Guayana, debouches about 8 miles westward of the Mana, and its entrance between Française point and Kaimar head is about 3 miles wide, and open to the N.N.E. On Kaimar head there is a Dutch post, and near it two remarkable little hills or high clumps of trees, which have the appearance of islets when first sighted. From the head the shore takes a north-westerly direction for about 5 miles and then resumes its westerly course; this short space is more elevated, and forms three little hills which are guides to the river.

From Française point the Mana mud flat stretches off to the northward 6 miles, and from Kaimar head a sand-bank runs off to the north-east about 3 miles, and breaks at half tide. Between the two there is a channel of 13 feet water, but it is only navigable for small coasters; large canoes can get up as far as Armina, which is a little below the first rapids.

"The two bluff points at the entrance may be seen 12 or 13 miles when in soundings of 5 or 6 fathoms water, the westernmost projecting out a little beyond the other. It is remarkable that in the vicinity of this river, the bottom is composed of red sand, which is a good guide for it in the night, the soundings off other parts of the coast for a distance of 30 miles being mud." *

Buoys.—At the entrance of the Maroni river, there are three *black* buoys, the outer one of which lies in 11 feet at low water neap tides, over muddy bottom, with Jean Pierre (an Indian camp of French Guayana) bearing S.S.W. The second buoy lies on the edge of the French bank in 16 feet over hard bottom, with the Mana river open S.E. by E.; Jean Pierre S. by W. $\frac{1}{4}$ W.; and the outer buoy, N.N.E. The inner buoy is in 21 feet over soft mud with the entrance of the Mana just closed E.S.E.; Jean Pierre, S. by E. $\frac{1}{2}$ E.; and the second buoy, N.E. $\frac{1}{4}$ N.†

DIRECTIONS.—It is advisable for vessels approaching the Maroni river to bring Papagaay en hoek (French Guayana) S.S.W., and to stand in upon this course with Zeekoe Kreek (Sea Cow creek) just open of Papagaay en hoek, which will lead to the outer buoy. The bottom on

* Capt. E. Rich, H.M.S. *Ringdove*, 1826.

† The description of the buoys, and the directions, are taken from a Government notice dated Paramaribo, August 1858.

this track will be soft mud. From the outer to the second buoy the course is S.S.W. When Française point is just in sight the bottom becomes hard; but the depth speedily increases. From the second to the inner buoy, steer S.W. and from thence direct the course for the middle of the river. In coming in all the buoys must be kept on the port side. When working out of the river, care must be taken not to go inside of the second buoy, as it lies on the edge of the French bank, which is very steep.

TIDES.—It is high water, full and change, at the entrance of the Maroni river at 5h. 30m.; springs rise 8 or 9 feet, and neaps 4 or 5 feet. The flood sets to the S.W. from the outer buoy to the mouth of the river; and the ebb to the N.N.W.

SOUNDINGS.—It would appear that great changes are always taking place in the soundings off many parts of the coast of Guayana, particularly near the land. In 1817, between the Connétables and the main, there was a depth of 8 fathoms, which in 1826 was reduced to 5 fathoms at low water. In the same period the depth in the channel between the Saluts and the shore changed from 8 to 4 fathoms. In the same interval, however, farther out between Cape Cachipour and the Maroni, no alteration was observed.

To the southward of Cape Cachipour, in the offing, the soundings differ again considerably. Off the entrances of the rivers the changes are naturally much greater and far more variable, and at certain periods occur almost daily. To the northward of Cape Orange the current becomes less rapid, and running parallel to the shore, enables the reckoning to be checked more correctly by the land and the latitude; here, therefore, the records may be more trusted.*

"It is to be observed, that in front of all the large rivers of Guayana, to a considerable distance from the land, the bottom is invariably mud and shells, which is a good guide, for elsewhere it is mud alone."†

The **TIDES** are not felt at any great distance from the coast, but in the space between the land and the general current which sets to the westward nearly in the direction of the coast at a distance of about 15 miles. The ebb tide, which sets to the north-east, meeting the general current, is diverted to the north-west, whilst a portion of it moves off in a circular direction towards the coast, forming eddies westward of the mouths of the rivers from whence it came. The water which enters the rivers on the flood tide is that which is detached from the ebb on meeting the general current, and runs in a curve line to the mouths of the rivers.

* M. Lartigue, 1827.

† M. Wight, Superintendent of Pilots at Demerara, 1852.

The **MUD BANKS** which border the coast of Guayana change their outline, disappear, and form again alternately. These banks remain longest in places sheltered from the effect of the current. The shore between Mont Mayé and Cape Orange is skirted by mud to a great distance; the limits of which, however, are nearer the shore than the main current, and they have seldom more water over them than 4 fathoms. It is presumed that the mud brought out of the rivers situated to the south-east is carried by the current on the flood to the northward and deposited in the eddies on this part of the coast.

In years of heavy rains, the tidal streams are of course very much stronger near the shore and in the rivers; the ebb then acquires sufficient force to carry the mud out to the current which conveys it away to the westward, depositing it in the eddies near the shore at the mouths of the rivers, and under the islets. When the rains are light, the tidal streams are consequently weak, and the ebb not having sufficient power to carry the mud out so far, it is deposited within and at the mouths of the rivers, forming banks of great extent. If they remain long in one position, they become indurated, and it requires several years of strong tides to remove them.

When they are in this hardened state, they are frequently discovered by the sea breaking heavily over them right into the mouths of the rivers, as if it were a coral bottom; whereas, over soft mud, the water is generally smooth, and offers temporary anchorage. The greatest changes appear to take place between Cape Orange and Cayenne, correct records of which have been kept at the latter place for a long period. Off Cayenne the hard mud bank, called the Sommes, never extends beyond the line of the Malingre and Père islets, because outside that the eddies are scarcely felt, and the tidal stream comes close out to the edge of the current.

The soundings change sometimes, however, between the Sommes and the *Enfant Perdu*; but the deposit there has not time to harden, and the bottom never rises beyond a certain elevation. In 1764 there were only from 7 to 9 feet water on the Sommes. In 1820 there were 14 to 17 feet in the channel; the winters of the two preceding years had been unusually rainy, the fluvial and tidal streams had consequently received increased scouring power, and were enabled to carry the *débris* out to the main current, and prevent its return on the flood; probably there never was so great a depth here as during the years 1819 and 1820.

In 1824 and 1825 very little rain fell, the streams were consequently feeble; the *débris* remained near the shore at the mouths of the rivers and accumulated in the eddies, and in 1826 there were only 5 feet water, where in 1820 there were 14 to 17 feet. The channels were also

much narrowed, and on the edges the depth was reduced from 16 to 2 feet. All that part lying outside the Remire and Dupont islets underwent a similar change. In the vicinity of Malingre islet, and N.N.E. 2 miles from Père islet, there were only 10 feet, where in 1820 there were 27 feet water. The winter of 1826 was very rainy, and the freshes carrying away the deposits from the mouths of the rivers, deepened again the channels ; and in the month of May there was little more water than in January.

MANGROVE TREES.—During the rainy season the mangroves are torn away from the banks of the rivers and thrown out upon the shallow mud flats, where they take root with great rapidity ; detaining the mud and elevating themselves with it, the features and even the direction of the coast are frequently changed to a considerable distance. To the northward of the city of Cayenne, in 1826, they had planted themselves where, in 1820, there was a depth of 15 and 16 feet water ; and about 20 or 30 years previous to this they approached within 2 or 3 miles of the *Enfant Perdu*.

ROUTES according to SEASONS.—If bound to the coast of Guayana, a vessel should endeavour to make the land near Mont Mayé (page 294), but should not approach too near the river Amazons, in order to avoid the *proroca*. Having made the land run along it with the lead constantly going in $6\frac{1}{2}$, 7, and 8 fathoms water, taking care not to have less, in order to avoid the shoals bordering the coast ; and although in these soundings land cannot be seen in some places, even in clear weather, it can be of no inconvenience, for on nearing the point of destination the vessel may be hauled in until the land comes in view.

This may be done whenever it is desirable to make out any particular part of the coast ; but in such cases the greatest attention must be paid to the lead. If a vessel gets near her port at nightfall it will be better to anchor ; and also in fine weather when within the limits of the tides, for the stream at the flood draws towards the land. A vessel even in 8 or 9 fathoms water will stir up the mud from the bottom, apparently as if her keel were ploughing through it ; and this might cause anxiety to a person observing such a circumstance for the first time.

July to November.—On the coast of Guayana from July to November is the fine season. The belt of variable winds north of the equator often extends as far as lat. 18° N. It does not, however, reach the shore, but follows nearly its direction at the distance of about 180 miles ; a vessel must therefore necessarily traverse the space of rains and calms in pro-

ceeding to Cayenne. In this season after reaching the trade wind a vessel should endeavour to pass about 300 or 450 miles westward of the Cape Verde islands, and from thence a course should be shaped to the southward so as to cross the variables as quick as possible, and gain the general winds, which advance as far as lat. 5° or 6° N.

Having met them it will be better to run between the equator and the parallel of 3° N., where the variables never reach at this period; here the winds are fresh and favourable, the weather continually fine, and the current strong to the westward. Endeavours should be made not to recross the parallel of 3° N. until soundings have been obtained in 45 or 50 fathoms, when a more northerly course may be pursued, until the depth is reduced to 6 or 7 fathoms. The land has nothing whatever remarkable on this parallel, and frequently is not visible from this depth; and a vessel will have no other means of knowing her exact position but the soundings and observations. The distance from the shore will be very doubtful, but all dangers are avoided by not coming within the depth of 6 or 7 fathoms.

December to May.—During this period the northern limit of the variables often extends as far as lat. 10° N. The weather is then generally rainy on the coast of Guayana, and at all parts of the ocean between that parallel and the southern limit of the belt of variable winds. As it is desirable at this period to preserve fine weather and favourable winds as long as possible, it will be better to cross the parallel of 10° N. between long. 37° and 42° W.; and if the voyage is made at the commencement or termination of the season of N.E. winds, the nearer the first meridian is crossed the better. Having crossed this line the course will be S.S.W. until the parallel of 3° N. is reached as before.

The rain at this season frequently prevents observations for latitude, and a vessel is consequently exposed to great uncertainty in her reckoning, more particularly as no dependence can be placed in the probability of her being able to see any of the remarkable mountains in the interior, as the land is approached. Between lat. 10° and 3° N. the current setting to the north-west must be estimated for, and, failing observations, the mariner should commence sounding as soon as he conceives himself to be on the parallel of 6° N. If bottom is gained on this line it will be a proof of being in the neighbourhood of the river Maroni, and consequently to leeward of Cayenne. Should soundings not be obtained until the 5th degree is reached, it will indicate a position to windward of that place, and a vessel may then haul more to the southward, to sight if possible the high lands in the neighbourhood.

It very seldom happens, however, that the dead reckoning is so far in

error as this, and the probability is that soundings will be struck in about lat. 4° N., or near the parallel of Cape Orange. In this case a S.S.W. course should be continued until in 10 fathoms water, when a more direct route may be shaped to double that cape. Should some time have elapsed without an observation for latitude, and it be supposed that the parallel of 3° N. has been gained without finding bottom, a more westerly course should be shaped until bottom is found in 30 fathoms, observing that to the southward of the parallel of Maraca island the bottom is gray sand, and to the northward of it mud.

In whatever position a vessel should find herself, if the N.E. winds which predominate at this period be moderate, a W.N.W. course should be pursued, so as to gradually decrease the depth. Should the wind be strong a N.W. by W. course may suffice, only care must be taken to keep in above 22 and under 30 fathoms water; this route ought to conduct to the neighbourhood of Cape Orange. As the cape is approached the soundings should diminish; therefore, if this be not the case, it will be necessary to haul in W. by S. until the depth is reduced to 10 fathoms.

In taking this route it will be easily seen whether the land will be sighted to the southward or northward of Cape Orange; if to the southward the depth will decrease very rapidly, and the contrary to the northward. In the former case it will be necessary to continue the westerly course until the depth is 11 fathoms, and then haul to the wind on the starboard tack; in the latter the ship's head should be put to the southward in order to gain the depth of about 6 fathoms as soon as possible. Should the weather be hazy and the land not seen, it will then be better to haul to the wind on the port tack, or if moderate to anchor; but upon soft mud. In the season of the rollers, perhaps, it will be more advisable to keep in the offing until the vessel's true position is determined. When to the southward of the cape in the season of strong N.E. winds, the shore should not be approached within the depth of 10 fathoms so as to fetch round it.

May and June.—The northern limit of the variable winds during these months extends to lat. 10° or 12° N. and they often reach as far as the coast of Guyana; and when they do not, they are never far off. The currents in this period are very strong; calms prevail, the weather is squally, and if it blows hard it is more often from the S.E. than the N.E. If the wind will permit, the parallel of 10° N. should be passed on the meridian of 37° or 40° W. The region of the variables will probably be entered in the lowest latitude, and a course should be shaped so as to reach the parallel of 3° N. before getting within 300 miles of the land,

and then followed until near the shore, which should be navigated in from 6 to 7 fathoms, as already directed. During these months and the latter part of April the winds are more favourable for navigating to the northward.

In the season of the N.E. trade, from December to the end of March, when observations for latitude are attainable, it may not be necessary to go farther to the southward than lat. 4° N.; but from April to July it is indispensable to go to 3° N., for if calms are met with, in traversing the great currents, which is very frequently the case, a vessel will most infallibly be drifted to leeward of Cayenne, and find great difficulty in getting to windward again. Should this happen, and the wind fail after getting into deep soundings, even in 60 fathoms, it will be better to bring up with a kedge or stream anchor, and await the breeze.**

M. Tardy de Montravel, 1851, states, "I have indicated one route only to make in all seasons, which I have pursued myself with success, and find recorded in 12 voyages by Captain Lebrouch, one of the most able navigators on this coast. On all others the irregularities from year to year in the same season are so great, that no certain rules can be established.

Off the coasts of Guayana the winds blow from East to N.E. during the winter, and from East to S.E. in the summer. The zone of variables and calms which separates the trade from the general winds seldom approaches the land nearer than 150 miles; or passes the parallel of 10° N., and disappears entirely to the westward of the meridian of 50° W. Experience appears to show that calms are the most frequent between long. 35° and 40° W. As this space must be traversed by vessels from Europe, it is of course advisable to cross it in the narrowest part, and at the same time not too far to the westward, to prevent the possibility of being carried to leeward of the point of destination by the great equatorial current.

With this view, on quitting Europe at all seasons, the parallel of 10° N. should be crossed between the meridians of 43° and 45° W., so as to pass the variable zone to the westward of its most difficult part, and at the same time sufficiently far to the eastward to be able, when gaining the regular winds, to make the land well to windward. When bound to Cayenne the course should be shaped, allowing one and a half points for a N.W. current, so as to strike soundings in lat. $3^{\circ} 30'$ N. in 9 or 10 fathoms. Having reached the depth of 5 or 6 fathoms, the course should be shaped parallel to the land; N. $\frac{1}{2}$ W. on the ebb, and N. $\frac{1}{2}$ E. on the flood, so as to preserve this depth until to the northward of Cape Orange."

* M. Lartigue, 1827.

ROUTE to WINDWARD.—Vessels of light draught proceeding to windward from the Antilles, or having been set to leeward of their port in the season of the N.E. winds, will find it easy to beat up between the land and the inner edge of the current, which is generally encountered in the depth of 5 fathoms. The inshore or port tack will of course be the most favourable, as the wind will generally allow the flood and current to be stemmed, and the ebb off the rivers to assist under the lee. Those of heavy draught leaving the rivers on the main, will find it more to their advantage to cross the main stream, and work up in the zone of variable current.

From May to November this will be the best plan to adopt by all vessels, for at this period the winds and currents are at their greatest strength. The inshore passage in these months should only be made by those drawing under 10 feet. Nevertheless, in the rainy season, an easterly current will sometimes prevail inshore, and run at the rate of even 3 knots. The direction of the principal current at a distance from the coast is nearly N.W. by W. and its general velocity from 2 to 3 knots, but the position where its strength slackens and the direction changes is extremely uncertain, and defies all rules.

Generally, however, a counter current will be met with between lat. 8° and 10° N. on the meridian of about 53° W., where its direction changes to North and N.N.E. Farther eastward its zone increases in breadth, its rate is greater, and its direction more easterly, as far as long. $37\frac{1}{2}^{\circ}$ W. From thence it progressively widens out, but decreasing in strength is finally lost in long. 25° W. In the northern part of this eddy, the direction of the wind and stream inclines more to the north, and the contrary on the southern limits. Profiting by these changes, and watching the reckoning closely, the voyage may be made to windward at the rate of 60 miles a day at least.*

When standing along shore, even in the depth of 10 fathoms, it will frequently appear as if the ship was stirring up the mud at the bottom; and on the soft banks correct soundings are very difficult to obtain.

DISCOLOURED WATER.—After passing to the southward of lat. 10° N. and between the meridians of 46° and 50° W. the water is often seen to change its colour from a light blue to dark green or dirty drab, with a current setting to the northward from one to $1\frac{1}{2}$ miles an hour. In the rainy season it has been found running to the N.N.E. at the rate of 2 to $2\frac{1}{2}$ miles. As the vessel proceeds to the S.W. on about the parallel of 8° N. the usual light blue tinge will be resumed, and she will then have entered the general westerly stream, and this colour

* M. Tardy de Montravel, 1851.

will continue towards the shore even within the boundary of deep soundings.*

CAUTION.—In order to check the errors which will naturally occur in a vessel's reckoning, from the varied effects of the great current which sweeps along this coast, and the uncertainty of obtaining regular astronomical observations, the seaman would do well, after reaching a moderate depth, to use a ground log, which will not only give him his true rate of sailing, but, by using the log ship at the same time, enable him to ascertain the velocity and direction of the current with tolerable accuracy. See page 221.

* Mr. W. Cook, Master of the ship *Highbury*, 1834, and others. Col. Sabine states that he found the stream of the *Amazons* in blue water, in lat. 5° N. and long. 50½° W.

TABLE OF POSITIONS.

Place.	Particular Spot.	Latitude.	Longitude, West.	Authorities.	Variation, 1894.
EAST COAST OF BRAZIL.*					
Mt. Paul's rocks	Summit	0 55 30 N.	29 23 0	Fitz Roy	13 15 W.
Fernando de Noronho	Concepcão fort	8 50 0 S.	32 25 0	"	11 15
Roccos	North-west cay	8 51 30	35 47 0	Various	10 30
Cape Branco	Extreme	7 8 30	34 45 57	Mouchez	9 15
Pernambuco	Picão fort	8 3 31	34 49 7†	King, Fitz Roy, Mouchez, and others	9 10
Bahia	Fort do Mar, or Mar-cello.	12 58 16 S.	38 28 8†	"	6 10
Morro San Paulo	Lighthouse	13 22 37	38 51 12	Mouchez.	
Onamut	Barra Grande beach	13 54 0	38 53 18	"	
Contas	Church	14 17 40	38 56 19	"	
Ilheus	Beach at entrance to river.	14 48 30	38 59 13	"	
Santa Cruz	North end of reef at entrance to river.	16 15 35	38 57 15	"	
Porto Seguro	Entrance to river	16 28 0	39 0 50	"	
Cape Joazeira	The little beach west of the cape.	16 44 0	39 5 18	"	
Mount Pascal		16 53 20	39 23 50	"	
Comoxatiba	Village beach	17 5 23	39 8 13	"	
Prado	Entrance to river	17 21 40	39 10 43	"	
Balea point		17 41 34	39 5 47	"	
Caravellas river	South point, mast	17 44 36	39 7 58	"	5 20
Abrolhos islets	Lighthouse	17 57 51	38 38 46	Fitz Roy and Mouchez.	
Porto Alegre	Entrance to Mercury river.	18 16 15	39 30 9	"	
Espirito Santo	Convent da Penha	20 19 23	40 13 42	"	4 0
Française isle	East point	20 55 0	40 41 57	"	
Cape St. Thomé	Extreme between	{ 21 59 0 22 1 0 }	40 56 2	"	
Cape Frio	Lighthouse	23 0 42	41 57 1	"	2 20
RIO DE JANEIRO					
Santos	Villegagnon fort	22 54 40	43 6 30	"	1 45
"	Arsenal	23 55 51	39 54 58	King and Fitz Roy.	0 50 E.
"	Moela lighthouse	24 3 6	39 59 13	"	
Paranagua	Fort at bar	25 30 14	37 54 22	"	
"	Cotinga island, west point.	25 29 50	37 45 0	"	
"	Church of San Antonio	25 25 42	37 31 40	"	
Cape Joas Dias		26 10 15	37 43 0	Mouchez.	
Santa Catharina	Anhatomirim islet	27 25 32	37 41 31†	King, Fitz Roy, Mouchez, &c.	2 30
Cape Santa Marta		28 48 0	48 47 21	Mouchez.	
As Torris	Reef or islet off it	29 19 30	49 39 53	"	
Rio Grande do Sul	Entrance to river	32 7 30	52 5 13	"	6 20
RIO DE LA PLATA.					
Rolands Gap		34 5 30 S.	53 42 53	"	7 45
Cerro Chico Navarro		34 6 10	53 49 13	"	
Cerro Chafalote		34 19 15	54 6 28	"	
Cerro Narvaez		34 28 15	54 7 30	"	
Cerro Silla Chica		34 31 30	54 27 53	"	
Cerro Sella Grande		34 29 50	54 33 43	"	
Morro San Ignacio		34 31 0	54 36 43	"	

* The longitudes from Cape Branco to the southward depend on Villegagnon fort, RIO DE JANEIRO. The fort is 3.9 seconds East of the Imperial observatory, and 2 seconds West of the Pan de Azúcar.

† See *Annales Hyd.ographiques*, 2^e trimestre de 1863, pp. 420-437, for the discussion of the longitudes marked †, by M. Mouchez.

Fort San Pedro at Bahia is 1.6 seconds West, and San Antonio lighthouse 4.1 seconds West of Fort do Mar.

TABLE OF POSITIONS.

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Place.	Particular Spot.	Latitude, South.	Longitude, West.	Authorities.	Variation, 1884.
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RIO DE LA PLATA—cont

		° ' "	° ' "		° ' "
Tres Carros	-	34 34 15	54 44 43	Mouchez	"
Cerro Carape	-	34 38 45	54 51 53	"	"
San Carlos	Centre	34 47 30	54 53 23	"	"
Cape Castillos	Buena Vista	34 21 19	53 44 10	"	8 15 E.
Cape Polonia	Summit	34 24 10	53 46 13	"	"
Polonia reef	Centre	34 26 10	53 47 55	"	"
Cape Santa Maria	Summit	34 40 1	54 6 13	"	"
Punta Piedras or San José Ignacio.	Centre	34 50 58	54 35 25	"	"
Lobos ialet	Centre	35 1 39	54 50 10	"	"
East point	Lighthouse	34 53 15	54 54 4	"	"
Gorriti island	Well at north-east end	34 57 2	54 55 15	Fitz Roy.	"
Pan Anzcar	Summit	34 49 5	55 12 13	Mouchez.	"
Maldonado	Tower	34 54 35	54 55 3	"	8 50
Ballena point	-	34 55 0	54 59 38	"	"
Black point	-	34 54 25	55 12 33	"	"
Sierra de las Animas	-	34 45 40	55 15 58	"	"
Punta de Afilar	-	34 47 42	55 26 53	"	"
Punta Piedras Negras	-	34 46 45	55 39 13	"	"
Flores	-	34 56 55	55 52 3	"	"
English bank	North part of breakers	35 9 0	55 51 23	"	"
Bucco point	-	34 53 40	56 0 33	"	"
Brava de Carretas	-	34 56 3	56 6 43	"	"
Monte Video	Custom house	34 54 15	56 9 43*	Fitz Roy, King, Mouchez, &c.	9 20
The Cerro	Lighthouse	34 53 3	56 12 33	Mouchez.	"
Panela reef	-	34 54 36	56 23 53	"	"
Santa Maria, or San Gregorio point.	-	34 41 20	56 46 38	"	"
Colonia	Lighthouse	34 28 0	57 49 0	"	10 20
Farallon	-	34 28 50	57 53 33	"	"
Hornos islands	Centre one	34 25 15	57 52 53	"	"
Ombu of San Pedro	-	34 21 20	57 51 58	"	"
Ombu of San Juan	-	34 14 40	57 55 48	"	"
Cerro of San Juan	Northern one	34 10 40	57 55 33	"	"
Martin Garcia	Summit	34 11 25	58 13 3	"	"
Las Vacas	-	33 58 50	58 14 23	"	"
Punta Gorda	-	33 52 55	58 25 43	"	"
Punta Chaparo	Mouth of the Uruguay	33 48 0	58 24 13	"	"

RIO DE LA PLATA (SOUTH COAST).

Cape San Antonio	North extremity	36 18 13	56 43 31	Fitz Roy	10 15
Isla de Juncal	-	36 0 1	57 20 43	Mouchez.	"
Mount Rosas	-	-	57 21 43	"	"
Salado river	Entrance	35 43 15	57 16 55	Fitz Roy.	"
Sanborombon river	Entrance	35 41 40	57 16 25	"	"
Piedras point	Extremity of grassy part.	35 26 50	57 2 51	"	"
Memoria point	-	35 20 0	57 4 43	Mouchez.	"
Indio point	-	35 15 45	57 8 13	"	"
Embudo point	-	35 2 0	57 28 13	"	"
Magdalena	-	35 4 50	57 27 43	"	"
Atalaya point	-	34 55 0	57 39 43	"	"
Banangan bay	-	34 50 0	57 55 33	"	"
Quilmes point	-	34 42 20	58 10 43	"	"
Buenos Ayres	Custom house	34 36 28	58 19 44	"	11 0
	Landing place (mole)	34 35 30	58 19 23	Fitz Roy.	"
Olives point	-	34 28 40	58 26 43	Mouchez.	"
Las Conchas	Village	34 25 15	58 31 38	"	"
Parana de las	Palmas entrance	34 17 0	58 39 43	"	"
Parana Guazu	Entrance	34 0 20	{ 58 20 23 } { 58 24 43 }	"	"

RIVER PARANA.

Parana	The port	31 42 47	60 30 15	"	10 35
Santa Fe	-	31 39 25	60 40 19	"	"
Esperance Colony	Director's house	31 26 40	60 50 29	"	"
Corrientes	The port	27 28 1	58 48 26	"	"
San Juan	"	27 22 7	58 38 26	"	"

* Rat island, in Monte Video Bay, is 4·8 seconds West of the Custom house.

Place.	Particular Spot.	Latitude, South.	Longitude, West.	Authorities.	Variation, 1864.
RIVER PARAGUAY.					
Cerrito	Entrance to Paraguay	27 17 30	58 34 57	Mouches.	" "
Humaita	Casemated battery	27 4 10	58 27 4	"	"
Nembucu	The port	26 51 8	58 17 40	"	"
Oliva	"	26 0 47	57 40 57	"	"
Villa franca	"	26 18 50	58 9 15	"	"
Villeta	"	25 30 50	57 32 39	"	"
Asuncion	"	25 16 40	57 37 25	"	7 ° E.
RIVER URUGUAY.					
Paysandu	The port	"	57 33 31	"	"
Concepcion	"	"	58 10 35	"	"
Gualeduaychu	"	"	58 27 54	"	"
Nueva Palmyra	"	"	58 23 43	"	"
Soriano	Village	"	58 18 51	"	"
Rio de la China	Entrance	"	58 9 31	"	"
Rio Negro	"	"	58 22 23	"	"
OFF LYING ISLANDS.					
Trinidad island	South point	20 31 0	29 16 30*	Various	10 30 W.
Martin Vas islets	Large one	20 28 0	28 50 0	"	"
NORTH COAST OF BRAZIL AND GUAYANA.					
Ceara	Church	3 43 0	58 39 2†	Lestigue, Hewitt.	7 15
Santa Anna island	Lighthouse	2 19 25	43 30 15	Montravel.	"
Maranhão San Luis	Sea battery	2 31 45	44 15 57†	"	3 45
Morro Itacolomi	"	2 19 14	44 23 37	"	"
Mansel Luis reef	West end	0 51 25	44 15 0	Roussin.	"
Cape Gurupi	"	0 54 5	46 11 16	Montravel.	"
Atalaia point	"	0 35 8	47 17 0	"	"
Tijoca point	"	0 34 0	47 53 31	"	"
Pará	Custom-house quay	1 26 54	48 27 42	"	1 30
Cape Magoari	"	0 13 30	48 25 55	"	"
Macapá	North-east bastion	0 0 50	50 59 30	"	"
Boulonnaise point	"	1 29 15	52 2 11	"	"
Almeirim	"	1 34 17	52 27 11	"	"
Praiaha	"	1 51 35	53 23 11	"	"
Monte Allegre	"	2 1 40	53 35 51	"	"
Santarem	Church	2 26 8	54 36 35	"	"
Obidos	House south of the port.	1 56 7	55 25 52	"	2 15 E.
Cape North	"	1 42 0	49 46 0	Raper.	"
Maraca islet	West point	2 13 10	50 28 31	Montravel.	"
Mount Mayé	"	2 49 30	50 52 21	"	"
Cape Cachipour	"	3 46 0	51 2 0	"	"
Mount Argent	"	4 23 15	51 37 51	"	"
Grand Connétable	Centre	4 49 50	51 53 6	"	"
Cape Orange	"	4 23 24	51 24 49	"	"
Cayenne	Fort	4 56 22	52 18 36	"	"
Salut islets	North extreme	5 16 50	52 52 51	"	"
Mount Diable	"	5 10 50	52 51 55	"	"
Maroni river	Française point	5 42 10	53 56 30	"	"

* Considering Villegagnon fort at RIO DE JANEIRO to be in 43° 6' 30" West of Greenwich.

† Depending on Rio de Janeiro. The other positions on the North Coast are, as stated by the authorities, against them.

‡ M. Mouches has adopted 0h. 4m. 38s. 2 as the meridian distance between Rio de Janeiro and San Francisco point, Maranhão; 0h. 21m. 21s. 1 between Rio and the Custom-house quay, Pará; and 0h. 36m. 44s. 4 between Rio and the Fort at Cayenne. See *Annales Hydrographiques*, 2^e trimestre de 1865.

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